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ABSTRACT

This project was funded by the National Science Foundation to help institutions of higher education develop course-related library instruction programs for students in undergraduate science programs. The first volume of the annual report for 1976-77 describes the project, which involved bringing together teams of librarians and teaching faculty from selected institutions, who attended and subsequently evaluated two workshop/conferences on library instruction. It includes a summary of the project proposal; descriptions of participant selection, project director activity, the October 1976 workshop, interim period activity, and the May 1977 workshop; summary reports of each participant's project; and an outline of second year plans. Announcements, a program list of materials, and the first section of the October 1976 workshop transcript are included in appendices one through four. (Author/KP)

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The Development of Course Related Library
and
Literature Use Instruction in Undergraduate
Science Programs

(NSF Grant DSI 76-10129)

Annual Report

June 22, 1976 - July 1, 1977

BEST COPY AVAILABLE

by

Thomas Kirk

Project Director

September, 1977

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List of Reports to NSF, June 22, 1976-July 1, 1977

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July, 1976 to August 3, 1976	2 pages
August, 1976 to September 1, 1976	3 pages
September, 1976 to October4, 1976	2 pages
Quarterly Report - November 20, 1976	11 pages and 39 pages (appendix)
October, 1976	None
November, 1976	None
December, 1976 to December 31, 1976	3 pages
January, 1977 to February 9, 1977	2 pages
February, 1977	None
March, 1977 to March 31, 1977	2 pages
April, 1977 to May 1, 1977	2 pages
May, 1977 to June 10, 1977	18 pages
June, 1977	None

Summary of Project Proposal

A. Summary of grant proposal:

While the proliferation of scientific literature over the past few decades has been a matter of increasing concern to the scientific community, it has created even greater problems for the undergraduate science student than for the trained scientist. For the latter, the problem is primarily one of physical access, but the student does not even know where or how to begin to look for materials. While the newer curricula in science education place more and more emphasis on independent study and use of recent research findings, students, because they are not taught how to use the literature of science, depend on the methods and tools they were taught in high school, and never learn how to use scientific bibliography well until they are well along in graduate programs. They may never experience as undergraduates the excitement of finding the key articles that shed new light on their explorations.

Yet it is not difficult to teach the strategy of searching scientific literature, and it can be done most effectively within the structure of many present courses. And, as we have discovered at Earlham after ten years of such experience, teaching students how to use scientific bibliography can contribute enormously to their interest in a course—even on a freshman level—and will encourage students to work more independently and to dig more deeply than they would otherwise.

This project attempts the development of techniques for improving the literature use skills of the undergraduate science students which can be used within existing courses, and attempts discussion and application of these techniques in selected institutions. These activities will be followed by dissemination of the results to the library and science education professions.

B. Changes in focus and intent, and organization of the project:

The original concept for the project involved bringing together teams of librarian and teaching faculty from selected institutions. These teams were to participate in three workshops/conferences: (1) August, (2) December, and (3) May or June. Because of the lateness in notification of the grant award we had to abandon the three workshop model and go to two.

The intent of the project was to assist selected institutions in the development of their library instruction programs. It was expected that the development of effective workshop activities would assist the participants in the development of a program designed for library and literature use to a specific class or classes which the faculty member teaches.

The Project Director attended a meeting of grantees and members of the Reader Panel of the proposals in lage July, 1976. In the discussions at the meeting and in subsequent discussions with Dr. Carole Ganz it became clear that the project should concerned with two levels of operation.

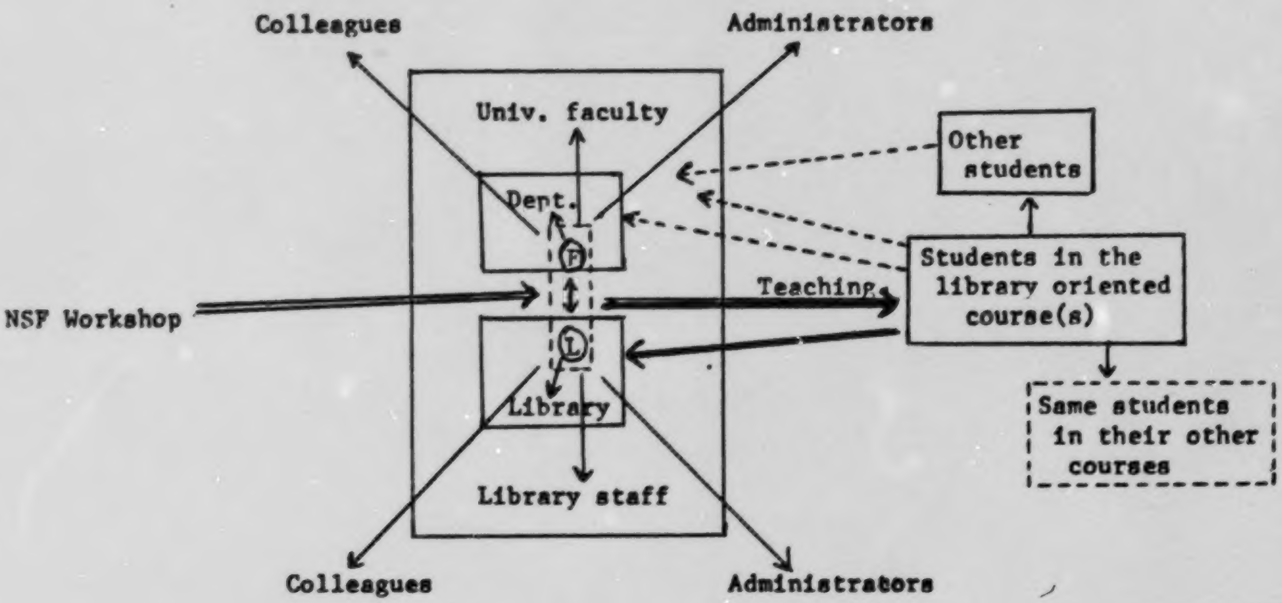
I. Preparation of workshop materials and activities to educate and assist team members from participant institutions.

II. Assess the impact of the workshops and other Project related activities on the library and literature use instruction activities of the participant institutions.

In order to achieve this change in focus the consultants to the project were given a wider range of responsibilities than had originally been planned. Instead of just evaluating the workshop itself and suggesting improvements in it, they were asked also to consider some of the wider context in which the project was being carried out. Jerry Bakker was asked to address the workshop on the issue of library instruction and faculty development in addition to evaluating the workshop, and Steve Nelson was asked to assist the Project

Director in developing strategies for assessing the impact of the project. Steve has already made an initial suggestion which is reported in Figure 1 here. More detailed plans will be one of the activities to be undertaken during the second year of the project.

Diffusion of Ideas


Colleagues
Administrators
Univ. faculty
Other students
Dept.
F
Students in the library oriented course(s)
NSF Workshop
Teaching
L
Library
Same students in their other courses
Library staff
Colleagues
Administrators

Each point and each connecting arrow is a potential data source.

Timing? When to assess? How often? Depends on your formative-summative goals.

Participants:
1. Teaching activities
2. Research activities
3. Other professional activities

x

a. major ideas, concepts re: teaching & library use
b. specific skills, behaviors

Figure 1

I. Selection of Project Participants

In order to select the Project participants under the severe time restraints we faced, the amount of advertising of the Project was limited. A brief description of the Project (Appendix I) was sent to approximately 75 institutions which had been identified as academic institutions presently giving course related library instruction in the sciences. Additional copies were sent to the eleven participating institutions in the HEW Fund for Improvement of Post-Secondary Education's National Project III, and to Library Journal/Hotline.

This brief announcement called for interested parties to request a fuller description of the Project and an application form (see Appendix I). Subsequently we received 43 requests for more information and from those 43, we received twelve applications. below is a statistical summary of the applicants.

			Size of Institution				Type	
Area of Country	# of Requests	# of Applications	0 to 1500	1500-4000	4000-10,000	over 10,000	Graduate & Undergrad	Undergrad
East	16	4	1	1	2	0	3	1
Southeast	5	2	1	0	1	0	1	1
Midwest	15	3	0	1	0	2	2	1
West	3	1	0	0	0	1	1	0
Southwest	3	2	1	0	0	1	1	1
Canada	1	0	0	0	0	0	0	0

Figure 2: Summary of Characteristics of Applicants to Participate in Project

The most distressing aspect of the applicant pool was the lack of applicants in the Mathematical, Physical and Engineering Sciences. The subject breakdown of the applicants was: Biophysics 1; Biology 2; Food and Nutrition 1; Microbiology 1; and Social Sciences 7. In consultation with Dr. Carole Ganz, the Project Director decided to postpone decisions on participants which was to have been made by August 10, 1976, while we searched for potential participants in the non-represented areas. About four to six initial contacts were made which eventually led to two applicants: one in Mathematics and

and one in Engineering. From this pool of 15 applicants four were selected. The names of the institutions and the team members and their positions are listed below:

University of Arizona (Tucson)	Joan Murphy, Science Reference Librarian
	James P. McCormack, Dept. of Electrical Engineering
	Dorothy Fuller, Dept. of English
Oregon State University	Robert E. Lawrence, Head of Science and Technology Division Kerr Library
	Leo Parks, Dept. of Microbiology
St. Olaf College	Katherine Rottsolk, Reference/ILL Librarian
	Marland Madson, Biology Dept.
Johns Hopkins University	Lucie H. Geckler, Science Reference Librarian
	Warner E. Love, Biophysics Dept.
SUNY, Pottsdam	Jeanne Dittmar, Reference Librarian (Participating in the workshop at her own expense; not a part of the Project)

Copies of their applications are in Appendix II.

The selection was based on three criteria. One, evidence of committment to try the concept, but little or no actual program development. We did not in this initial round want persons who are not already sympathetic to the idea. On the other hand the project was not conceived as an opportunity for those with the advanced programs to discuss and modify them, or to help implement such advanced programs in new areas of their cirriculum they had not yet undertaken. This first criteria eliminated three applicants. These three were subsequently asked to supply sets of materials which they had developed. Cedar Crest/Muhlenberg and the University of Rhode Island did provide those materials and they were incorporated into the workshop materials.

The second criteria was evidence in their application of a realistic concept of what they wanted to accomplish, and a committment by the institution to the Project. While this did not eliminate out-of-hand any particular applicant, it did permit us to rank the applicants.

The third criteria was not so much a criteria for the applicant as it was a goal for the Project. From the very beginning we committed ourselves to a balance in the areas of the country represented, subject areas represented, and size and type of institutions represented in the participant group. One other factor which entered into the selection process was the participant institutions contributions to the visibility of the Project.

II. Project Director Activity

During late August the Project Director attended a workshop presented by BIOSIS. He attended it for three reasons, two, not directly related to the grant - to obtain better understanding of the BIOSIS system, particularly on-line searching, and to observe how they taught the use of an information source. The third reason, which was related to the grant, was to observe the workshop format and to get ideas on what to do and not to do in a workshop. From this experience he gained a great deal of insight into workshop operations, and as a result has developed the following list of do's and don't's:

1. Prepare participants adequately by providing them with a schedule and a clear idea of the workshop's purpose and content.
2. Provide sessions for active participation in the conference early.
3. Mix content presented formally with other types of activities.
4. Do not overload sessions with content, particularly with related, but nonessential information.
5. Allow ample opportunity for interaction.
6. Provide for social occasions outside the regular sessions of the workshop.
7. Organize written material to be handed out so it can be followed easily by participants.
8. The workshop group should be small so that leaders can interact better with participants.
9. Make sure physical surrourdings and use of audio-visuals do not hinder workshop activities.

We kept all of this in mind in developing our workshop.

III. October, 1976 Workshop

The objectives for the workshop as we stated in a letter to the participants were:

1. Your team will be aware of the major features and problems of course-related library instruction;
2. Your team will be intimately familiar with Earlham's program in Biology, as an example of an intensely integrated library instruction program;
3. Your team will be aware of other types and patterns of course-related instruction both at Earlham and elsewhere;
4. Your team will have written a statement of the objectives for the library instruction component of the professor's course;
5. Your team will have a written list of tasks and activities which each of you will complete in order to accomplish the objectives.

To achieve these objectives, we designed the workshop along the following lines. The pace and focus should be divided into three areas. The first is primarily information transfer. We envisioned using the first day to supply as much background information, and provide as much documentation as possible. The second should be less structured, in an interactive mode, and concerned with the participants' project. Third, we have also assumed that the interaction of the group members on a social level is important for the success of the group, and therefore participants should be housed together, and spend as much time as possible together, with some of it in low-key social activities.

The first segment of the workshop consisted of a combination of formal presentations and role playing. These sessions lasted from 9:00 a.m. of the first day through to approximately 2:45 p.m. (see the schedule in Appendix II for details). This technique was used to totally immerse the participants in Earlham's program of istruction in biology.

The second segment of the workshop was intended to supply information on the variety of types of instructional activity on library and literature use in undergraduate science education that are being used. This information took three forms: (1) presentations and materials by Earlham librarians and teaching faculty, (2) instruction material from Cedar Crest/Muhlenberg and the University of Rhode Island, and (3) sample materials from across the country as supplied by Project LOEX.

The third segment of the workshop was on evaluation of library instruction activities. This session consisted of a brief summary of what Earlham has done, followed by critique and general discussion by Richard Johnson of Earlham's Psychology Department. This was followed by an open-ended question and answer session.

The text of the transcription of the first day's activities is included in Appendix IV.

The fourth segment of the workshop was an unstructured opportunity for the participants teams to discuss their program and to make some plans for their projects. This was followed in the afternoon of the second day by a "fish bowl" situation in which the team presented a description to Tom Kirk and Jerry Woolpy of what they planned to do. The rest of the participants observed the description and the interaction amongst the two of us, and then entered the discussion.

The schedule of the workshop was allowed to remain flexible. While the original plan had been to have the teams discuss their projects with Jerry Woolpy and Tom Kirk privately, and then to present it to the group, the participants asked to combine the activities into the "fish bowl" session. This freed the last half day of the workshop and permitted participants to visit classes, and talk with some of Earlham's faculty.

The workshop was evaluated in four ways.

(1) The workshop participants completed an evaluation form which is included in Appendix V along with the summary results. This summary speaks for itself. The participants as they left Earlham on October 22, were enthusiastic, felt their time had been well spent, and that their physical needs had been more than adequately satisfied. From their perspective, on October 22, there is very little we can do to improve the workshop.

(2) The Project consultants, Jerry Bakker and Stephen Nelson, provided written observations on the workshop which are included in Appendix VI. Stephen's report is a more lengthy report because he was asked, as an outsider, to give us a full review and evaluation of what we had done. Jerry's comments, although more cryptic, confirm many of Stephen's and the Project Director's observations. In addition to Jerry Bakker's written comments, he participated in a one-hour post-mortem session with Jerry Woolpy and the Project Director. The Project Director has synthesized the various comments in the following statement.

1. Much of the success of the workshop can be attributed to the structure which allowed for social interaction to occur, and more importantly to the fact that the personality "fit" of the participants allowed them quickly to become a cooperative, congenial group. This aspect is impossible to take into account in the selection process unless a more elaborate applicant system is used; a step we do not anticipate taking;
2. The flexibility in scheduling should remain. The ability to change the schedule in the later portion was important to the participants' sense that they were getting what they wanted out of the workshop;
3. Furthermore, the basic schedule design was appropriate and will be continued. However, two modifications will be made. (1) The session on other programs (segment 4) should have fewer speakers and should cover in more detail the programs presented. (2) The discussion of

the participants' proposed programs should be longer;

4. Participants should be asked to prepare a written statement of their proposed program objectives, and what tasks each team member is going to have to complete;

5. Some practical aspects of the workshops that need changing:
   (a) Participants' sleeping quarters should be closer to the campus;
   (b) Meeting room size is a little too small;
   (c) Package of workshop materials should be assembled, indexed and distributed at the beginning of the workshop, rather than handed out piece by piece.

(3) At the May follow-up workshop the participants were divided into discussion groups of four each, one group with Jerry Bakker and one with Stephen Nelson. Each group was to answer three questions:

A. Given your recent experience, how should the Fall Workshop be revised?

B. List the problems of implementing your program which you did not anticipate.

C. List the problems of implementation which seem common to more than one of the institutions.

The answers to these questions are included in Appendix VII. To summarize the content of those answers the following points should be made.

A. 1. The group remains enthusiastic about the workshop, the project and their participation. Participants emphasized two elements of the workshop as important: (1) overall design and (2) small size of group.

2. The nonscience coverage was interesting but not critical.

3. Need for more details on "how-to-do-it". This is particularly true for the evaluation of their project.

B. 1. Coordination between the instructor and librarian.

2. The Earlham model raised expectations too high.

C. 1. Difficulty in getting other faculty interested.

2. Physical problems of preparing large numbers of handouts.

3. Little recognition of preparation time needed.

(4) The workshop was indirectly evaluated through the evaluation of the four project reports by the Project Director. This evaluation is included later in this report in Section VI Project descriptions and evaluations.

IV. Interim Period October, 1976 to May, 1977

When the overall design of the project was changed, we recognized that the project would have a problem of maintaining contact with the participants while they were developing their program and implementing it. In order to maintain the contact, the Project Director made several contacts by letter and telephone encouraging the participants, offering suggestions and generally making himself available to the participants for consultation. Very early in this period we sent the participants the tentative schedule for the May workshop and guidelines for the content of their reports (Appendix VIII). We also requested brief interim reports in late March or early April.

On the whole I think the contacts had little impact on the development of the projects. The contacts were infrequent and often untimely. On the other hand the regular contact was good for maintaining interest and keeping the participants focused on their tasks. We would like in the future to develop procedures for helping participants with the actual development of their program.

V. May, 1977 Workshop

The May, 1977 Workshop had as its purpose the communication by the participant teams of what they had done to the Project Director and to each other. (The schedule for the workshop is in Appendix IX.) Upon the arrival of the participants they submitted their written reports. These reports were checked and the most relevant portions duplicated so all workshop participants could have copies. Copies of these excerpts are included in Appendix X, and summarized later in the report (Section VI Project Descriptions and Evaluations). Following some time to read the reports, each team was allotted one hour during which they could orally supplement but not summarize their written report and answer questions. At the end of the day the participants were asked to complete an "Inventory of Key People" form (Appendix IX) and to divide up into discussion groups to evaluate the project. This evaluation is discussed earlier in this report.

During the initial sessions the participants' opening comments were not helpful in elaborating on their written reports. Most of each hour consisted of a question and answer dialogue among Jerry Woolpy and Tom Kirk. Gradually as each hour progressed, greater involvement on the part of the rest of the participants occurred.

VI. Participants' Projects and Evaluation

Below is a summary of each project. Each includes the following parts: (1) description of the team and the participating institution; (2) description of the project, what it was to accomplish; (3) what was done between October, 1976 and May, 1977 for the project; (4) the Project Director's assessment of the status of the team's work; and (5) generalizations and other points applicable to other programs. (Several of the points were made repeatedly but are only listed under one institution. These points are starred.)

I. Oregon State University (Corvallis, Oregon)

(1) Description of the team and the institution

Robert E. Lawrence
Head, Science/Technology Division, Kerr Library

Leo Parks
Professor, Dept. of Microbiology

Oregon State University, a coeducational state institution, is a land-grant and sea-grant college. Programs are offered leading to bachelor's degrees in the Schools of Humanities and Social Science, Agriculture, Business Technology, Education, Engineering, Forestry, Home Economics, Pharmacy, and Science and in the Division of Health and Physical Education. Enrollment: Fall 1970: 15,507. Undergraduate 13,203; Graduate 2,250. Library: 643,189 volumes; 6,328 current periodicals; 11,089 microfilm reels; 320,921 other units of microtext; 2,828 discs. 110,189 volumes added, $1,474,000 spent on books and periodicals 1967-68 - 1970-71. School of Science: Departments and Teaching Staff, 1970-71: Atmospheric sciences professors 1, associate professors 2, assistant professors 3, instructors 0, additional part-time 0; biochemistry and biophysics 6,3,4,0,0; botany 13,7,3,2,0; chemistry 15, 7,5,0,7; entomology 10,3,2,0,0; general science 2,6,7,2,3; geography 3,0,2,0,0; geology 2,5,4,0,1; mathematics 16,8,13,7,3; microbiology 6,1,2,1,0; oceanography 10,8,18,4,0; physics 5,9,5,0,0; statistics 6,2,8,1,0; zoology 5,8,2,0,3. Total: 281. Men full time 254, part time 13; women full time 9, part time 4. Degrees held: 245 doctorates, 23 master's, 13 bachelors. Enrollment: Fall 1970: 3,032. Undergraduate 2,213; graduate 807. --American Colleges and Universities. 10th ed. Washington D.C., American Council on Education. pp. 1304-7.

(2) Description of their project; what it was to accomplish

Application statement:

(A) Freshman Orientation: Introductory lecture survey of microbiology with emphasis on problems and research objectives;
(B) Advanced General Microbiology: Intermediate course emphasizing general methods and specific techniques of microbiology;
(C) Advanced Microbial Physiology: Highly technical course emphasizing the latest research and development techniques.

Participants' statement in October, 1976:

(A) During Winter quarter (January-March, 1977) plan to work with 8-10 students in an advanced microbiology seminar. Instruction will consist of: Guided exercise (modified version of Earlham's); Guided exercise on Chemical Abstracts. Students will be writing several papers, and will have a final exam that asks them to up-date a review article that is several years old.
(B) During Spring quarter (March-May, 1977) plan to work with same group on government documents.
(C) During Fall quarter (September, 1978) voluntary program for about 70 freshmen students.
(D) Evaluation of their work will be subjective analysis by professor and librarian.

I. Oregon State University, con't.

(3) What the participants actually did

(A) They followed their plan as listed above in their October 1976 statement with few exceptions which included: (i) the addition of a student evaluation questionnaire; and (ii) use of three slide-tape programs (of their own creation) on Biological Abstracts, Chemical Abstracts, and Science Citation Index.

(B) In addition to their project's target courses, Robert Lawrence (librarian) was involved in a seminar class in the Department of Fisheries and Wildlife, a special honors program, and gave science bibliography lectures in a separate course on library use offered under the University's Council on Library Resources Grant.

(C) Robert Lawrence attended Dr. Joe DeSalvo's NSF Chautauqua Short Course on use of computerized bibliographic data bases in undergraduate science education.

(4) Project Director's assessment of the status of the team's work

(A) Robert Lawrence is a commited librarian. His biggest problem will be to get additional staff or involve present staff in the instruction effort. He was not fully prepared for the time commitment involved. He is pushing for a half-time education coordinator for the Science/Technology Division of the library. As long as he remains at O.S.U. they will have some form of instructional program, but it is difficult to see it becoming comprehensive for the sciences in less than five years, and then only if he gets help.

(B) Leo Parks came to the project skeptical of the potential contribution of the library to his work. He left the October 1976 workshop convinced of the possibilities, and excited about trying something. It is not clear from the written reports exactly how he participated in the instruction except as professor of the course, and the generator of the questions on which students worked. The oral report this Spring, 1977, indicates he remained enthusiastic about the activity. It is my judgment he will continue to involve the library in his upper class courses.

(C) The intensification of the library's involvement in the Microbiology Department's courses will depend on the success of the library's contribution in the Fall of 1978. I see this effort as important because it will have an impact on other faculty in the department. In addition, because of their sequential curriculum, a successful program at the beginning level can lead to more sophisticated use in later courses without having to do all the instruction in one course as was done in the advanced microbiology seminar this year.

I. Oregon State University, con't.

(5) Generalizations and other points learned from this project which are applicable to other programs

(A) One of the most important objectives of an instructional program is to get students over their unwillingness to ask librarians for help.

(B) There is the potential for copyright problems which librarians will have to face in using sample pages from reference tools in their handouts. Some national group should undertake negotiations to eliminate these problems.

*(C) In teaching process or technique oriented skills (i.e. library use) subject content relatedness is important to effective learning of those skills.

II. University of Arizona (Tucson, Arizona)

(1) Description of the team and the institution

Joan Murphy
Science Reference Librarian

James McCormick
Adjunct Professor, Dept. of Electrical Engineering

Dorothy Fuller
Lecturer, Dept. of English

University of Arizona is a coeducational state university and land-grant college offering undergraduate programs in the Colleges of Agriculture (including School of Home Economics), Architecture, Business and Public Administration, Earth Sciences, Education (including School of Library Science), Engineering, Fine Arts (including School of Music), Mines, Nursing and Pharmacy. Enrollment: Fall 1970: 24,877. Undergraduate 1[illegible]3; Graduate [illegible]586. Library: 1,164,834 volumes; 12,700 current periodicals; [illegible],000 microfilm reels; 200,000 other units of microtext; 12,500 discs. 192,520 volumes added, $1,878,710 spent on books and periodicals 1967-68 - 1970-71. Holdings include Arizona and Western history books, manuscripts, original source materials; collections on agriculture, anthropology, geology, Spanish and Latin American literature, Oriental studies, astronomy, optical sciences. *College of Engineering*: Departments and Teaching Staff, 1970-71: Aerospace and mechanical engineering professors 18, associate professors 3, assistant professors 1, instructors 1, additional part-time [illegible]; civil engineering 11,6,1,1,0; electrical engineering 14,6,3,0,0; nuclear engineering 3,2,2,0,2; systems engineering 7,3,2,0,1. Total: 89 men; full time 84, part time 5. Degrees held: 65 doctorates, 19 master's, 5 bachelor's. Enrollment: Fall 1970: 1,410. Undergraduate 1,3[illegible]. --*American Colleges and Universities*. 10th ed. Washington D.C., American Council on Education. pp. 142-145.

(2) Description of their project; what it was to accomplish

Application statement:

Library and literature instruction will be designed for a technical writing course which is offered every semester by the English Department to four sections of students. Next year we shall be expanding this course to include special sections in engineering writing. This course will be designed to involve intensive use of the resources and staff of the Science Library.

Participants' statement in October, 1976:

(A) In James McCormick's freshman level engineering courses. Library instruction in conjunction with a paper.

(B) In Dorothy Fuller's technical writing course. A unit on literature search technique in conjunction with the production of a paper. For this a one hour presentation, and a bibliography of sources are envisioned.

II. University of Arizona, con't.

(2) con't.

(C) After 1976-77. The development of a two term English requirement, and the implementation of a three level library instruction program. This will include the re-institution of a research paper at the end of freshman year/beginning of sophomore year.

(3) What was done between October 1976 and May 1977 for the project

(A) A structured and formalized program was developed by Dorothy Fuller and Joan Murphy for the technical writing class. This included a one hour presentation on science reference sources, an extensive bibliography of reference sources, and volunteer interviews with the librarian, Joan Murphy. Students' preliminary bibliographies and introductions to the reports were graded before students completed their final reports. Students were also required to compile a list of the library tools they used in gathering the bibliographies--both the preliminary and final ones. The professor and librarian both spent considerable time working with students.

(B) Instruction for Dr. McCormick's class was given in the form of an oral, in-class presentation accompanied by three brief bibliographies. This presentation was given by a librarian not part of the project. In the Fall semester students had several options for term projects, one of which was a library research problem. During the Winter semester, after the October workshop, all students were required to do a library-based research paper.

(C) For evaluation Dorothy Fuller used a comparison of the preliminary bibliographies and the final bibliographies, and the two accompanying lists of reference tools. She also called for a written student evaluation of the library program in the course.

(D) Dr. McCormick's evaluation was a subjective one done by the professor.

(4) Project Director's assessment of the status of the team's work

(A) Joan Murphy is a pleasant, capable librarian. She is anxious to do a good job and is therefore thorough and careful in her work. She was, at the beginning of the Project, relatively new to library instruction activities. Therefore her effort this year was unsophisticated. However, she has learned a great deal about the pedagogy of library instruction and has developed the self confidence to proceed. She will work well with faculty as they turn to the library for help in the development of course-related library segments for their courses.

II. University of Arizona, con't.

(B) Dr. McCormick and Dorothy Fuller remain enthusiastic about library instruction in their courses. Furthermore they are crucial to the development of the program in engineering. If Dorothy can convince several other English faculty of the importance and value of library instruction, it is likely that a library instruction program will be included in the engineering writing course. Dr. McCormick has the potential for influencing the School of Engineering faculty. They have projected a multi-level program within the engineering curriculum. If his enthusiasm can be complimented with careful planning and quality response from the library, the engineering department will develop a successful program.

(5) Generalizations and other points learned from this project which are applicable to other programs

*(A) Follow-up of formal instruction is needed.

*(B) Instruction can be more effective if it compliments the previous experiences of students. Therefore mechanisms which sort students out into similar groups and are followed up with instruction aimed at the particular groups will be more successful.

(C) The choice of the student's library task is critical to the quality of the educational experience. However, it is not clear what the essential characteristics of an appropriate task is. It has been suggested that a question to be answered rather than a general topic to be explored is better. Furthermore, the task should engage the student in the material (=information); the task should not permit the student to be passive.

(D) Library instruction does not save time; it may improve quality of library use; it certainly intensifies library use.

III. Johns Hopkins University (Baltimore, Maryland)

(1) Description of the team and the institution

Lucie Geckler
Science Reference Librarian

Warner Love
Professor, Biophysics Department

Johns Hopkins University is a private coeducational university. The Faculty of Arts and Sciences and the Evening College, both on the Homewood campus, offer undergraduate and graduate programs. Enrollment: Fall 1970: 9,679. Undergraduate 4,113; graduate 3,262. Library: 1,985,075 volumes; 14,170 current periodicals; 12,663 microfilm reels; 491,374 other units of microtext; 155 tapes or cassettes; 3,900 discs. 113,014 volumes added, $1,241,162 spent on books and periodicals 1967-68 - 1970-71. Special collections: William H. Welch Medical Library; library of School of Advanced International Studies; U.S. government and UN documents; Tudor and Stuart Club collections of 17th-century literature; Hutzler collection of economic classics; Birney slavery collection; Leonard L. Mackall collection; Strouse rabbinical library; Loewenberg collection of modern German drama; Collitz collection on linguistics; Couet collection of French drama; McCoy art collection; Hoffman collection of Bibles; Fowler collection of architectural classics; Ottensen Icelandic collection; Hauer Oriental collection; Havens Southey collection; Vincent collection on Swiss history; John Work Garrett collection of early Maryland items and the history of art (36,000 volumes); Kent Currie collection on book arts; manuscripts of Sidney Lanier, Francis Lieber, D. C. Gilman, John Banister Tabb, Edward Lucas White; John Work Garrett Library, on its own grounds near Homewood, housing rare books and other collections. *Faculty of Arts and Sciences*: Departments and Teaching Staff, 1970-71: Biology professors 12, associate professors 4, assistant professors 8, instructors 0, additional part-time 7; biophysics 5,2,0,0,2; chemistry 11,4,6,0,1; classics 4,1,0,0,0; computer science 3,2,4,1,4; earth and planetary science 10,6,3,0,0; education 5,0,4,0,0; electrical engineering 5,8,4,0,1; English 9,0,3,0,0; geography and environmental engineering 6,4,4,0,1; German 2,2,2,0,0; history 10,5,2,0,0; history of art 3,0,2,0,0; history of science 2,1,1,0,0; humanistic studies 3,1,0,0,0; mathematics 7,2,9,1,0; mechanics 12,2,3,0,0; military science 1,0,4,0,0; Near Eastern studies 1,2,2,0,2; operations research and industrial engineering 6,2,2,0,1; physical education 0,0,0,7,0; physics 13,3,7,4,0; philosophy 6,5,0,0,0; political economy 6,2,5,0,1; political science 8,1,5,0,1; psychology 11,2,6,0,1; Romance languages 4,2,4,3,1; social relations 4,4,3,0,11; statistics 3,4,0,0,3; writing seminars 1,0,0,1,3. Total: 394. Men full time 344, part time 35; women full time 10, part time 5. Degrees held: 358 doctorates, 20 master's, 12 bachelor's, 4 professional. Enrollment: Fall 1970: 5,487. Undergraduate 2,108; graduate 1,480. --*American Colleges and Universities*. 10th ed. Washington, D.C., American Council on Education. pp. 684-685.

III. Johns Hopkins University, con't.

(2) Description of their project; what it was to accomplish

Application statement:

To provide library instruction for the course Principles of Physiology.

Participants' statement in October, 1976:

Students will be assigned to write three short papers. For each they are expected to base the writing on original research in the journal literature. The instructional package will include: an annotated bibliography, map of the library and science reference area, and list of current periodicals.

(3) What was done between October 1976 and May 1977 for the project

Lucie Geckler attended several lecture sessions of the course, Principles of Physiology. Warner Love assigned three papers as he indicated in October he would. Arrangements were made for the librarian to give a thirty minute presentation to the class during a voluntary, but regularly scheduled "Problems review session" held outside the lecture time slot. In preparation for the lecture the librarian prepared a physiology guide to resources, and one-pagers: "Card catalog: its use," "MeSH Subject Headings," and "Science Citation Index: its Citation Index section."

Lucie Geckler used a student evaluation form, which was supposed to have been turned in with the paper. However, Warner Love did not require it and therefore there were few returns.

(4) Project Director's assessment of the status of the team's work

Johns Hopkins, according to Warner Love, is a very competitive place, and the faculty generally take the position that students should not be "spoon fed" or have "their hands held." Whether or not this is true, Warner Love believes it to be the case, and this attitude influences his reaction to library instruction. He is willing, eager for the library to provide instruction formally to his class. However, he wanted it on the students' time, not the course's (=his) lecture time.

Lucie Geckler is a librarian who wants to be helpful to students. She has recognized students' immediate problems and tried to respond to them. When she began the project she was not fully sensitive to the difference between orientation to a library facility and instruction in the use of the literature and the library's reference materials.

The experience in the project has moved these two to question some of the assumptions they had. While both remain firm in their basic disposition towards library instruction, they both realize there is more to the problem than they once thought.

III. John Hopkins University, con't.

(4) con't.

The continuence of this effort will depend on Lucie Geckler's assertiveness with the regular professor in charge of "Principles of Physiology", who is not Warner Love. She will have to continue to cope with the faculty's attitude that students must sink or swim based on their own inner resources or lack of resources. The development of a truly course-related instruction program will probably therefore have to exist outside or on the fringe of courses. And the success will depend on the willingness of the library staff to work hard with a small fraction of the students, and with little or no feedback from faculty.

(5) Generalizations and other points learned from this project which are applicable to other programs

(A) It is important for the future success of a program for the librarian to have feedback from the professor on student performance.
(B) Student evaluation of programs should be required if a meaningful set of data is to be collected.
(C) The need for instruction must be clearly perceived by students.

IV. St. Olaf College (Northfield, Minnesota)

(1) Description of the team and the institution

Katherine Rottsolk
Reference Librarian

Marland Madson
Professor, Biology Department

St. Olaf College is a private coeducational liberal arts college affiliated with The American Lutheran Church. Programs are offered leading to bachelor's degrees in liberal arts, education, nursing, and music. The experimental Paracollege was opened in 1969. Departments and Teaching Staff, 1970-71: Aerospace studies professors 1, associate professors 0, assistant professors 2, instructors 0, additional part-time 0; art 0,1,4,0,1; biology 3,2,2,1,1; chemistry 0,4,3,1,0; classical languages 0,1,1,0,0; economics 1,0,1,2,4; education 1,1,2,0,2; English 0,9,3,2,3; German 0,2,2,2,2; history 3,1,3,1,2; geography 0,0,0,1,1; home economics 0,0,1,2,1; mathematics 3,0,3,1,4; music 5,4,9,2,18; Norwegian 1,0,1,0,1; nursing 1,3,1,4,4; philosophy 2,0,0,3,1; physical education 1,4,3,3,1; physics 0,4,2,0,1; political science 0,1,2,2,0; psychology 1,1,3,1,3; religion 3,3,3,0,2; Romance languages 1,0,2,2,4; Russian 0,0,1,0,1; sociology 1,2,2,2,1; speech 3,0,1,1,0. Total: 222. Men full time 125, part time 30; women full time 39, part time 28. Degrees held: 102 doctorates, 89 master's, 31 bachelor's. Enrollment: Fall 1970: 2,674. Undergraduate 2,630 full time. Library: 245,778 volumes; 944 current periodicals; 1,559 microfilm reels; 2,549 other units of microtext; 1 film; 2,850 discs. 42,159 volumes added, $236,500 spent on books and periodicals 1967-68 - 1970-71. Holdings include 132,800 items in 698 manuscript collections; collection of Scandinavian languages and literature; Bible collection in hundreds of languages. --American Colleges and Universities. 10th ed. Washington, D.C., American Council on Education. pp. 836-837.

(2) Description of the project; what is was to accomplish

Application statement:

We would like to develop an integrated library and literature instruction package for our biology offerings. Originally, the main emphasis would be on the introductory courses, one for majors, and one for non-majors.

Participants' statement in October 1976:

Repeated essentially the same thing without being more specific.

(3) What was done between October 1976 and May 1977 for the project

The team developed a specific set of objectives for the introductory course sequence. This is graduated to provide for increasingly sophisticated understanding and use of libraries and the literature. During March-April, a reference librarian not associated with the project gave instruction in the use of the library to a genetics class of 175 students, during the laboratory periods. Following the lecture the professor and librarian were available in the library to help students.

IV. St. Olaf College, con't.

(3) con't.

"Committees" of students were asked to review specific types of reference tools for material on a question. Members of each committee were re-combined to form new groups that had a representative of each type of reference tool category. A resource person met with each group as they shared information. Following this an assigned paper was completed by the students.

In addition to developing the objectives for the introductory courses, a strategy for instruction has been developed. For the Fall, 1977, it includes: (a) a biology-specific library pre-test; (b) use of library-trained biology student laboratory assistants; (c) class lecture with handouts; (d) practical use of the library in laboratory period; and (e) a bibliographic essay assignment. For the Spring, 1978, genetics class a unit on "evaluation of materials found" will be included, and a research paper will be assigned and evaluated on the basis of content and search strategy. In Level III instruction the practice of student peer evaluation of library papers will be introduced.

A similar program, but less elaborate, will be introduced into the nursing program.

(4) Project Director's assessment of the status of the team's work

There is no question of the enthusiasm and commitment of Katherine and Marland. However, they have deliberately been cautious in the development of their program, as they rightly should be. Their program is the most intensively course-related, and will work with the largest number of students and support personnel of the four projects described in this report. If they are to reach their goal they will have solved some major problems. If they fail there will be no hiding it; they have a great deal to gain and lose.

There is no question that their efforts will go forward since they have support for the project from the Council on Library Resources and the National Endowment for the Humanities. The Project Director will continue to have contact with their work in a consulting capacity. The success of the program will not begin to be visible until Spring 1978 and later.

I believe their experiences gained from the genetics course this past year have sensitized them to the problems they face.

(5) Generalizations and other points learned from this project which will be applicable to other programs

None that are not already listed above.

Second Year Plans

The second year actually began in January of 1977 when we announced the plans for the second year of the project. The announcement was sent to several journals. Unfortunately it was too late to appear in most of them. One in which it did appear, College and Research Library News, gave it special attention in their "Grants" column. (A copy of the announcement is Appendix XI.) Because the announcement could not appear in many of the places we wanted it to, the decision was made to mail announcements to each of the libraries of each institution of higher education in the U.S.

As a result of these announcements, we received 313 requests for additional information. An analysis of the origin of these requests is below.

There were 86 applications;

			Size of Institution					Type of Institution		
Area of Country	# of Requests	# of Applic.	0 to 1500	1500-4000	4000-10,000	over 10,000	Unk.	Graduate & Undergrad.	Undergrad.	Comm. Coll.
Northease	80	20	7	7	3	1	2	10	10	0
Southeast	95	26	11	6	2	5	3	14	12	1
Midwest	83	23	9	4	4	1	4	11	7	4
West	23	9	4	1	0	2	2	4	4	1
Southwest	32	8	2	1	1	2	2	1	5	2
Totals	313	86	33	19	10	11	13	40	38	8

The successful applicants are:

Drew University, Madison, N.J.; Pamela Snelson/Donald Scott
Penn Valley Community College, Kansas City, Mo.; Patricia Lorenz/Evelyn Staatz
San Jose State University, San Jose, Calif.; Cecilia Mullen/Leonard Feldman
Virginia Polytechnic Institute and State University, Blacksburg, Va.;
Anatole Scoun/Charles Hurst
Albion College, Albion, Mich.; William Miller/John Parker

Copies of the fact sheet from their applications are in Appendix XII.

It is apparent from the number of applicants that this project speaks to the felt needs of many, many academic libraries and science faculty. Because the project has three objectives: (1) to help other institutions develop their course-related library and literature use instruction programs in undergraduate science; (2) to develop viable models of course-related library and literature use instruction in undergraduate science education, other than Earlham's; and (3) to diffuse the idea and models in the academic community; it was felt, by the Project Director, that, money allowing, the Project should sponsor a third workshop.

After consultation with Dr. Carole Ganz at NSF, it was decided that a second* workshop in the second year should be held. However, the participants will pay their own expenses to get to Earlham and the project will pay for the accommodatio in Richmond, and the costs of the workshop. These are modest expenses which should total less than $2,000. The purposes of this workshop will be (1) to gather additional models of development. The major difference will be that the project will not be providing major stimulation through a follow-up workshop or the payment of honoraria. Therefore we have the potential to see the development of new programs where the only input from the project is workshop content and personal contact. And (2) to test the format and conditions as a possible model for continuation of the workshops after the completion of this project. The Project Director feels that dissemination of the project's findings, and the promotion of the concept of course-related library and literature use instruction in undergraduate science education might be done in the future through regional workshops similar to the additional one being held in the second year.

*Ball State University, Muncie, Indiana;
James F. Comes (Department of Library Service)
Ruth H. Howes (Physics Department)

Central Arizona College, Coolidge, Arizona;
    Glen Gordon Tiller (Assistant Director Public Services)
    Marion E. Cornelius (Department of Science and Mathematics)

Central College, Pella, Iowa;
    Robin Martin (Director of Public Serivces)
    Kenneth Tuinstra (Assistant Professor of Biology)

Guilford College, Greensboro, North Carolina;
    Rose Anne Simon (Library-Faculty Liaison Officer and Coordinator of Professional Information Services)
    Frank Keegan (Biology Department)

University of Richmond, Virginia, Richmond, Virginia;
    Katherine Smith (Science Librarian)
    W. Allan Powell (Professor of Chemistry and Department Chairman)

Indiana University-Purdue University at Fort Wayne, Fort Wayne, Indiana:
    Mary Lou Stewart (Assistant Reference Librarian and Health Science)
    Phyliss Eckman (Assistant Professor of Nursing)

The National Science Foundation has just announced the funding of a project to help institutions of higher education develop course-related library instruction programs. The project involves bringing teams (consisting of a librarian and teaching faculty member) from several institutions together in two several day workshop/conferences which will explore the philosophy of course-related library instruction in undergraduate education, the problems of implementing such a program, and possible solutions. A first workshop session will be held in the last quarter of 1976 and a follow-up briefer session in mid-1977. Only a very limited number of teams will be selected. To be eligible, the academic department must express a commitment to the idea of course-related library instruction and the faculty member and librarian team must already be considering or implementing a program. The individual teams must commit themselves to attend the workshop/conference and the follow-up session (expenses paid by the Project), to work on the development of their program including trial use, and the completion of a report on their efforts for which a modest honorium will be paid. This select group will also help in the formulation of strategies for later years of the Project. Earlham College is now receiving inquiries about the project, and will upon request send specific information and a participant application form. Contact person: Thomas Kirk, Science Librarian, Box E-72, Earlham College, Richmond, IN 47374. Deadline August 1, 1976.

THE DEVELOPMENT OF COURSE RELATED LIBRARY AND LITERATURE USE INSTRUCTION IN UNDERGRADUATE SCIENCE PROGRAMS

--AN NSF FUNDED PROJECT SPONSORED BY EARLHAM COLLEGE

Introduction:

The objective of this project is the promotion and development of the course-related approach to library and literature use instruction in the sciences (as defined by the National Science Foundation this includes the quanitative social sciences). To achieve this objective the National Science Foundation has awarded a two year grant for $30,000 to Earlham College so that the following activities can be undertaken.

The Project Director, Thomas Kirk, Science Librarian at Earlham College, has been involved with teaching faculty in the sciences, particularly biology, in the development of library instruction which is integrated into and is a fundamental part of regular subject course offerings. This program has been in effect for approximately ten years and has been in our judgement and in the judgement of outside observers, an enormous success (see attached bibliography). But while much can be learned from the experience of Earlham and other institutions, each institution, and more particularly each department, must develop a program which compliments their own program and curriculum. This Project is an attempt to help departments involved in undergraduate science education develop such a program.

Project Plan:

The plan and timetable for the project is as follows:

August 1, 1976: Deadline for applications.

August 11, 1976: Selection made of four pairs of librarians and teaching faculty, one pair each from four different institutions for which financial support will be provided. Selection will be done on the basis of commitment to the idea of course related instruction, and in an effort to get institutional variety, subject variety, and broad geographical representation. Additional pairs, who are willing to underwrite their own expenses are welcome. If applicants are not accepted and wish to participate under those circumstances, they should address a letter to that effect to the Project Director upon receiving a letter that they were not accepted. This latter group will also be limited in number.

October 19-22, 1976: Workshop/conference sessions at Earlham College. (Arrival on the 19th; sessions begin the 20th; program ends at noon on the 22nd.) The workshop/conference will cover three matters:

1) Presentations from faculty and librarian viewpoints of what Earlham's program is; what it tries to accomplish, and how. In addition alternative patterns of course related instruction used elsewhere will be discussed.
2) Individual discussions with each of the four or more teams about their programs or proposed programs in an effort to clarify their objectives, and map out the general approaches to the achievement of those objectives.
3) A general discussion by the group, of what activities the second year of this proposal should support. The thought is that the initial participants and the people at Earlham should explore together the ways in which the idea of course-related library instruction can be promoted and developed within both the library and teaching professions. The activities of the second year of this project will be based on these and later discussions.

October 23-Jan. 1, 1977: Development, by the participant teams, of their instructional programs. Earlham people will be available for consultation via telephone and mail.

Jan. 1-June, 1977: Participants implement their programs and complete a written report on the objectives of their programs, their activities, and an assessment of the program's strengths and weaknesses.

June 8-10 (tentative): Report (above) is due. Workshop/conference sessions at Earlham College. (Arrive on the 8th, sessions begin the 9th and conclude at noon of the 10th.)

The sessions will focus on two items:

1) A sharing by participants of their experiences.
2) Development, with help from continuing education consultants, of a plan for the second year.

June 1977-November 1978: Second year activities of the project.

Responsibilities:

Responsibilities of the participants:

1) Involvement in and/or commitment to course related library instruction.
2) Ability and willingness to attend both workshop/conference sessions.
3) Ability and willingness to complete instruction materials, use them, and complete the reports.
4) Willingness to participate in the second year activities as developed by the participants.

Responsibilities of participant's institutions:

1) Provide moral and financial support (where necessary).
2) Committed to the idea of course related library and literature use instruction.

Responsibilities of the Project:

1) Provide the consultant services described on the previous pages both through the conference/workshops and individualized through mail or telephone.

2) Underwrite the transportation, and room and board for participants while attending the two workshop/conferences.

3) Provide an honorarium for completion of reports.

Application:

IF HAVING READ THIS DESCRIPTION YOU ARE INTERESTED IN THE PROJECT AND IN BEING A PARTICIPANT PLEASE COMPLETE THE ENCLOSED APPLICATION AND RETURN TO THE PROJECT DIRECTOR BY AUGUST 1, 1976. IF QUESTIONS ABOUT THE PROJECT REMAIN PLEASE CALL (DO NOT WRITE) THE DIRECTOR AT 317-962-6561. (HE WILL NOT BE AVAILABLE BETWEEN JULY 17 AND 23.)

Farber, Evan Ira. 1974b. Library instruction throughout the curriculum: Earlham college program. Pages 145-162 *in* John Lubans, Educating the Library User. R.R. Bowker, New York.

Kennedy, James R. 1970. Integrated library instruction. *Library Journal* 95:1450-1453.

Kennedy, James R. and Thomas G. Kirk, and Gwendolyn A. Weaver. 1971. Course-related library instruction, a case study of the English and Biology departments at Earlham College. *Drexel Library Quarterly* 7:277-297.

Kirk, Thomas G. 1972. Role of the library in an investigative laboratory. Pages 144-164 *in* Commission on Undergraduate Education in the Biological Sciences, The laboratory: a place to investigate. CUEBS, Washington, D.C.

Passarelli, Anne B. and Millicent D. Abell. 1974. Programs of undergraduate libraries and problems in educating library users. Pages 115-131 *in* John Lubans, Educating the library user. R.R. Bowker, New York.

Wilkinson, Billy R. 1972. Reference services for undergraduate students: four case studies. Scarecrow Press, Metuchen, N.J. 421 pp.

APPLICATION TO PARTICIPATE
IN EARLHAM COLLEGE'S
"DEVELOPMENT OF COURSE RELATED LIBRARY AND LITERATURE USE INSTRUCTION IN UNDERGRADUATE SCIENCE PROGRAMS" PROJECT

1. Librarian's name and position.

2. Faculty member's name and department.

3. Address to which correspondence should be sent.

4. Phone number.

5. For what coures(s) would your course-related library and literature instruction be intended? Give title, general description, and average number of students enrolled per year:

6. For the librarian (complete A and B, or C). (Use extra sheets if necessary.)

   A. Have you given any library instruction, either course-related, informal group instruction, or a separate course? Describe what you have done. Please include samples of any materials you have prepared.

6. B. What do you see as the weakness(es) in your program?

C. If you have not done anything in the area of library and literature use instruction, state what you would like to do. Do so only in general terms, but include your theories of what course-related library and literature use instruction should be and do.

7. For the faculty member: (complete A, B, and C). (Use extra sheets if necessary.)

A. Describe what you see as the educational benefits for your students of course-related library instruction. If you are currently involved, describe what you see is the value of such instruction to your students. If you are only thinking about it, state what you believe could be the benefits.

B. Describe what you believe are the contributions which your library staff can make or are making to course-related library and literature use instruction.

7. C. Describe what you believe is your role in a course-related instruction program.

8. For the team: In general terms, what would you like instruction in library and literature use in the faculty member's course(s) to achieve?

9. Attach letters from the chairperson of the academic department and the librarian's supervisor which support the application.

SEND COMPLETED APPLICATION TO THE ADDRESS BELOW BY MAY 1, 1976.

THOMAS KIRK
Box E-72C
Earlham College
Richmond, IN 47374

#1

APPLICATION TO PARTICIPATE
IN EARLHAM COLLEGE'S
"DEVELOPMENT OF COURSE RELATED LIBRARY AND LITERATURE USE INSTRUCTION IN UNDERGRADUATE SCIENCE PROGRAMS" PROJECT

1. Librarian's name and position.

Katherine Rottsolk
Reference/ILL Librarian
St. Olaf College
Northfield, Minn. 55057

2. Faculty member's name and department.

Marland Madson
Biology Department
St. Olaf College

3. Address to which correspondence should be sent.

St. Olaf College
Northfield, Minnesota 55057

4. For what course(s) would your course related library and literature instruction be intended? Give title, general description, and average number of students enrolled per year:

We would like to develop an integrated library and literature instruction package for our biology offerings. Originally, the main emphasis would be on the two introductory courses, one for majors, and one for non-majors. See the attached sheet copied from the college catalog.

5. For the librarian (complete A and B, or C). (Use extra sheets if necessary).

A. Have you given any library instruction, either course related, informal group instruction, or a separate course? Describe what you have done. Please include samples of any materials you have prepared.

During the last few years, the reference librarians have worked with individual instructors on assignments—and have taught to those assignments—for Biology 21,22,31,51,52, and an occasional Interim course. Instruction has been given both in the classroom and in the science library. We often use an overhead projector showing a very simple flow chart and various index pages from SCI, Biological Abstracts, and Bioresearch Index.
I have included some of the library assignments for the advanced courses; for the beginning courses, we have generally just helped set up a literature search for a topic which is then chosen by the individual student.

made up by the classroom teach

B. What do you see as the weakness(es) in your program?

Our basic weakness is, as I see it, that we have a catch-as-catch-can approach, without an overall objective or plan. We badly need the incentive to take the time to decide together what library expertise can be expected of a biology major, and a non-biology major in biology courses. Then we need to study the biology course offerings together to see in which courses instruction in specific tools and methods at graduated levels of sophistication would be appropriate. After that, a librarian and the teacher of a course need to consider the course content to structure a meaningful assignment.

It is clear, too, that we have never built on previous instruction--whether given in biology or other departments--so we have not built on or reinforced previous learning.

C. If you have not done anything in the area of library and literature use instruction state what you would like to do. Do so only in general terms, but include your theories of what course related library and literature use instruction should be and do.

6. **For the faculty member: (complete A, B and C). (Use extra sheets if necessary.)**

   A. **Describe what you see as the educational benefits for your students of course- related library instruction. If you are currently involved, describe what you see is the value of such instruction to your students. If you are only thinking about it, state what you believe could be the benefits.**

Whether our students are biology majors or not, they should be able tp pursue a reasonably sophisticated search strategy when using the science resources of the library.

Our non-majors should be able to find and evaluate background materials and information on current topics of interest; for them, the teaching emphasis will be toward less technical, more interdisciplinary and general literature sources.

St. Olaf graduated over 80 biology majors in 1976; approximately 60 will continue their education in graduate or professional programs. For them, the ability to conduct in-depth literature searches and to judge the authority of the materials uncovered is essential.

Of course, both tracks should help to develop the critical thinking toward which we hope each St. Olaf student aspires.

   B. **Describe what you believe are the contributions which your library staff can make or are making to course-related library and literature use instruction.**

Each professor in the department is a subject area specialist; yet, we are teaching general courses to undergraduates. The librarians, as "generalists", have a knowledge of both new and older library tools and a greater awareness of how to use these to best search the literature.

C. Describe what you believe is your role in a course-related instruction program.

As the biology department's library instruction coordinator, I would see my role as three-fold:

1

1) as a classroom instructor, helping to develop the program

2) as a colleague, consulting with other teachers in biology so they are advised of their students' previous library instruction and helped to capitalize on it in their courses, and

3) as a co-worker with the librarians, working toward a program where St. Olaf students may gain the knowledge to use well the literature of the sciences and may have the opportunity to grow in their use of this ability.

SEND COMPLETED APPLICATION TO THE ADDRESS BELOW BY AUGUST 1, 1976.

THOMAS KIRK
Box E-72
Earlham College
Richmond, Indiana 47374

2-9

APPLICATION TO PARTICIPATE

IN EARLHAM COLLEGE'S

"DEVELOPMENT OF COURSE RELATED LIBRARY AND LITERATURE USE INSTRUCTION IN UNDERGRADUATE SCIENCE PROGRAMS" PROJECT

1. Librarian's name and position.

   ROBERT E LAWRENCE
   Head, Science/Technology Division
   Kerr Library
   Oregon State University, Corvallis, Oregon 97331

2. Faculty member's name and department.

   LEO W. PARKS
   Professor
   Department of Microbiology
   Oregon State University, Corvallis, Oregon 97331

3. Address to which correspondence should be sent.

   Robert E Lawrence
   Head, Science/Technology Division
   Oregon State University
   Corvallis, Oregon 97331

4. For what course(s) would your course related library and literature instruction be intended? Give title, general description, and average number of students enrolled per year:

Freshman Orientation: Introductory lecture survey of microbiology with emphasis on problems and research objectives. 40 students per year.
Advanced General Microbiology: Intermediate course emphasizing general methods and specific techniques of microbiology. 70 students per year.
Advanced Microbial Physiology: Highly technical course emphasizing the ltest research and development techniques. 35 students per year.

5. For the librarian (complete A and B, or C). (Use extra sheets if necessary).
   A. Have you given any library instruction, either course related, informal group instruction, or a separate course? Describe what you have done. Please include samples of any materials you have prepared.

5.

A. Have you given any library instruction, either course related, informal group instruction, or a separate course? Describe what you have done.

For the past year, I have been coordinating and, with the assistance of other librarians in the Science/Technology Division of the O.S.U. Library, teaching a course in "Information in Science and Technology" for science undergraduates enrolled in the Honors College Program. This course meets one hour a week for 10 weeks, and we expect to offer the course next year. The Honors College enrolls superior students for a variety of "extra" courses in addition to enrollment in a subject department. 15 to 20 students take the course each term. My approach to the class is to show why information is necessary to students in science and how this information is acquired and organized by the O.S.U. Library and how this information can be found in the library. Because of the variety of student interests, there has been no attempt to teach the class from a particular subject viewpoint. Rather, the emphasis has been on the way the library gathers information, how this information in organised in this library, and how the student can find relevant information when he wants it. This means that we discuss the administrative organization of the library, how books and journals are requested, ordered and cataloged, where librarians find out about these materials, how the card catalog organizes information and why we need additional tools to supplement the card catalog, how indexes and abstracts are put together, and the great variety of disciplines for which there are abstract or index journals. In addition, we look at three specific areas; energy, environmental impact statements, and citation analysis. The final class meetings are a discussion of information retrieval and a demonstration of the Library Information Retrieval Service using a question from one of the class members.

In addition, the staff of the Sci/Tech Division regularly conducts sessions of one or two hours about the library in general or on a specific subject in which the students are working. These are usually tours or lectures and may be given to classes of as many as 100 students. For those classes which meet regularly with a librarian once each term or once each year, we have prepared bibliographies, journal lists, or instruction sheets, (samples are enclosed) Generally these sessions are held on an ad hoc basis.

B. What do you see as the weakness(es) in your program?

First, the 10-week course is too general; that is, the material is not related to any particular class or program that the students are in at the time. The relevance of the course is not as apparent to the student as it should be. The course should be related to specific course work going on at that particular time. Second, there is no student participation except for discussion of the topics. The course consists of lectures and tours or demonstrations. This does not allow the student to participate in using the library. There is no real problem-solving; no opportunity for individualized help. The student is not really learning a skill which is what a library course should be about. The course should be one in which the students learn specific skills, not a general introduction to the library. The course should be teaching students how to be intelligent library users, not just what is in the library. Third, there was not enough class time to pursue some of the topics discussed.

C. If you have not done anything in the area of library and literature use instruction state what you would like to do. Do so only in general terms, but include your theories of what course related library and literature use instruction should be and do.

6. For the faculty member: (complete A, B and C). (Use extra sheets if necessary.)

A. Describe what you see as the educational benefits for your students of course- related library instruction. If you are currently involved, describe what you see is the value of such instruction to your students. If you are only thinking about it, state what you believe could be the benefits.

The Microbiology Department has no current program of library instruction. Most of our students do not know how to use resources beyond their assigned textbooks. They don't know what is in the library, or how to go about looking for relevant information. Even if they do find information, they have no skill in organizing and synthesizing data. It is very difficult to get the students to give up their dependence on textbooks and to adopt the critical and investigative methods of the experimental scientist.

A course-related library program will introduce the student to an increasing variety of resources. (basic journals, symposia and conferences, abstracts and indexes, computer information retrieval, etc.) Because the students will be exposed to research resources in stages, they will gain both competence and confidende. The library component can be made more relevant to the student by focusing on individual student interests as well as assigned class work; some problems will be designed for small group problem-solving.

Science students have to learn how to solve problems. This can be taught in the laboratory, but can also be taught in the library. A student who knows how to find data, identify what is relevant, and use it to solve a problem is learning, on the one hand, about science, and, on the other hand, how to be a scientist. A well designed sequence of problem-solving library tasks related to the coursework will teach the student an approach which can be applied in other situations and used later independent of teacher or organized course. Coincidentally, the student will develop communication skills valuable to him or her in all courses.

B. Describe what you believe are the contributions which your library staff can make or are making to course-related library and literature use instruction.

The librarian will work with the course instructors to help them design useful library studies at different levels of student proficiency. Every effort will be made to design problem-solving tasks which are cumulative and sequential. While it is the responsibility of the instructor to develop the goals for the program, the librarian will provide the resources for attaing these goals. The librarian and instructor will plan together to develop the appropriate strategies the students are to adopt in approaching different types of problems. The librarian should meet with the students and introduce the role of the library in the work of the scientist. Beginning with the least experienced students he can show them how to do selected literature searches, emphasizing sources and techniques. As the student progresses, a greater variety of sources and more sophisticated techniques can be taught. With the most advanced students, computer assisted search methods will be offered.

C. Describe what you believe is your role in a course-related instruction program.

The role of the instructor will be to provide the student with problems or conflicts of data that will stimulate the student to seek answers. The problems will be designed in cooperation with the librarian. The instructor will need to monitor the student's progress, especially with inexperienced students, to avoid dead ends or highly frustrating searches. As the student progresses, the instructor can stimulate a critical evaluation of the literature by examples in class; some of the more advanced problems in the sequence will teach critical as opposed to fact-finding skills. Through written and oral reports the student will be encourgged to develop his communication skills and to organize his efforts in a productive manner. The instructor must provide adequate class time and provide suitable assignments with the cooperation of the librarian.

SEND COMPLETED APPLICATION TO THE ADDRESS BELOW BY AUGUST 1, 1976.

THOMAS KIRK
Box E-72
Earlham College
Richmond, Indiana 47374

#14

APPLICATION TO PARTICIPATE
IN EARLHAM COLLEGE'S
"DEVELOPMENT OF COURSE RELATED LIBRARY AND LITERATURE USE INSTRUCTION IN UNDERGRADUATE SCIENCE PROGRAMS" PROJECT

1. **Librarian's name and position.**

   Dr. Lucie H. Geckler Ph.D., Science Reference Librarian

2. **Faculty member's name and department.**

   Dr. Warner E. Love Ph.D., Biophysics Department

3. **Address to which correspondence should be sent.**

   Johns Hopkins University, Homewood
   34th and Charles Street
   Baltimore, Maryland 21218

4. **For what course(s) would your course related library and literature instruction be intended? Give title, general description, and average number of students enrolled per year:** Principles of Physiology. Introduction to the fundamental mechanisms of the major physiological systems; circulatory, digestive, excretory, nervous, muscular, endocrine, and reproductive. Control and homeostatic mechanisms will be emphasized. Occasional lectures on malfunctions in the various systems will be given by medical experts. The course is intended for non-science majors and there are no prerequisites. About one-hundred students.

5. **For the librarian (complete A and B, or C). (Use extra sheets if necessary).**
   A. **Have you given any library instruction, either course related, informal group instruction, or a separate course? Describe what you have done. Please include samples of any materials you have prepared.**
   I have given both informal group instruction and course related instruction. The most recent group instruction was given to a group of Biology graduate students who were first given a physical orientation to the library with emphasis on the areas most needed by them (location and use of the card catalog, serials catalog, inter-library loan and Science Library). A brief explanation of the Library of Congress classification was given with examples taken from Biology and Biochemistry. They were also introduced to the use of the Library of Congress Subject Headings and many other relevant reference tools in the Science Library with special emphasis on Biological Abstracts. I have also given many freshman

5. A. (cont.)

tours of the library which consisted primarily of physical orientation as well as numerous instruction sessions to groups of staff members to orient them to the Science Library.

As to course related instruction, in the past three years I have conducted sessions for a course called Chemical Principles Laboratory with one-hundred students (four sections). Each section received instruction in the Science Library involving physical orientation and brief explanations of the use of relevant reference tools (Inorganic Syntheses, Chemical Abstracts, Merck Manual, etc). In the past year I have given library instruction in two courses: Science of the Sea and Technical Writing. An exploratory talk and course outlines were obtained from the instructors. Pathfinder bibliographies were then constructed (see attached illustrations).

For the Technical Writing course the instruction took place in the Science Library where physical orientation and explanation of the use of the most relevant reference tools was given (especially writing guides and various science and technology indexes and abstracts).

In the course, Science of the Sea, the lecture was given in the classroom. Slides were used to orient the students to the library and to teach them the use of the catalogs and Oceanic Abstracts.

B. What do you see as the weakness(es) in your program?

So far the primary weaknesses in the program have been: 1) limited contact with the course and its instructor (I should like to attend some of the lectures leading up to the library instruction period and also take time to test the effectiveness of the instruction in cooperation with the course instructor). 2) limited time for the instruction itself (we have had to omit critical material such as the general body of literature in the field).

C. If you have not done anything in the area of library and literature use instruction state what you would like to do. Do so only in general terms, but include your theories of what course related library and literature use instruction should be and do.

6. For the faculty member: (complete A, B and C). (Use extra sheets if necessary.)

A. Describe what you see as the educational benefits for your students of course- related library instruction. If you are currently involved, describe what you see is the value of such instruction to your students. If you are only thinking about it, state what you believe could be the benefits.

In this course the students are given term papers to write on a topic of their own choosing so that they learn to use the library and especially to use the original literature in the field of physiology. Course-related library instruction would result in knowledge of bibliographic tools, relevant literature and effective search strategies. Such instruction is applicable to all physiology courses and by application to science courses.

B. Describe what you believe are the contributions which your library staff can make or are making to course-related library and literature use instruction.

The library staff can supply lists of useful references and locations in the library, instruct in the use of library tools (handbooks and encyclopedias, abstracts, and indexes such as Biological Abstracts and Index Medicus) as well as explaining how to get from the latter to the original literature. They can also acquaint the students with the general body of literature in the field and the various search strategies which may be employed to locate information.

C. Describe what you believe is your role in a course-related instruction program.

My role in a course-related instruction program is: 1) to supply to the librarian an outline of the course and any lists or syllabi given to the students 2) to allow the librarian to listen in on the course lectures and labs as she sees fit 3) to allot specific time during the course for library instruction and 4) to plan with the librarian the objectives of the instruction and ways to test whether they have been achieved. In Principles of Physiology (25.10) the objective will be learning to use the library to tap the original literature, and the test of results achieved will be the examination of the term papers turned in. The assignment of the paper is a self-administered exam on how well the student has learned his library expertise.

SEND COMPLETED APPLICATION TO THE ADDRESS BELOW BY AUGUST 1, 1976.

THOMAS KIRK
Box E-72
Earlham College
Richmond, Indiana 47374

APPLICATION TO PARTICIPATE

IN EARLHAM COLLEGE'S

"DEVELOPMENT OF COURSE RELATED LIBRARY AND LITERATURE USE INSTRUCTION

IN UNDERGRADUATE SCIENCE PROGRAMS" PROJECT

1. Librarian's name and position.

Ms. Joan F. Murphy, Science Reference Librarian,
University of Arizona Library

2. Faculty members' name and department.

Dr. James P. McCormick, Department of Electrical Engineering,
University of Arizona

Ms. Dorothy Fuller, Department of English,
University of Arizona

3. Address to which correspondence should be sent.

Ms. Joan F. Murphy
Science Library
University of Arizona
Tucson, Arizona 85721

4. For what course would your course-related library and literature instruction be intended? Give title, general description, and average number of students enrolled per year:

Library and literature instruction will be designed for a technical writing course which is offered every semester by the English Department to four or five sections of approximately twenty-five students each. Students come from a variety of majors and diverse scientific fields. Next year we shall be expanding this course to include special sections in engineering writing. The Engineering Department, the English Department, and the Library are cooperating together, both to modify the structure of the existing course and to develop the special sections in engineering writing. The course will be designed to involve intensive use of the resources and staff of the Science Library. It will also utilize a systems approach for teaching technical writing which is discussed in the attached N.S.F. Proposal by Dr. James McCormick of the Department of Electrical Engineering.

5. For the librarian (complete A and B, or C). (Use extra sheets if necessary).

A. Have you given any library instruction, either course-related, informal group instruction, or a separate course? Describe what you have done. Please include samples of any materials you have prepared.

I am interested in working closely with the Engineering and English Departments both in restructuring our present technical writing course and in helping design the new sections in engineering writing. I feel I have the necessary background to help develop this new program. In addition to four years experience and a Master's in Librarianship, I hold a second Master's in Education from Stanford, a B.S. in Biology which also included work in chemistry and the physical sciences, and have three years teaching experience. Recently I have become involved in library instruction at the University of Arizona, giving tours of the Science Library and informally working with groups of students from different departments, such as the Home Economics Department - introducing students to reference materials, government documents, and journals in their particular field. I am also in charge of giving tours and informal library instruction to Spanish speaking patrons at the Science Library, as I speak fluent Spanish and spent two years at universities in Spain and Mexico.

B. What do you see as the weakness in your program?

A weakness of our program is the fact that, although we have already begun the course in technical writing, the sections in engineering writing are not yet in the University catalog of courses. Getting sections in engineering writing formally included in the University curricula will be an important step in our program. Another weakness may be the difficulty in adapting the course to students of various scientific and cultural backgrounds. Many of our science students are from foreign countries, especially Latin America and the mideast.

- Joan Murphy

6. For the faculty member: (complete A, B and C). (Use extra sheets if necessary).

   A. Describe what you see as the educational benefits for your students of course-related library instruction. If you are currently involved, describe what you see is the value of such instruction to your students. If you are only thinking about it, state what you believe could be the benefits.

Familiarity with the technical literature of a field gives a student the feeling of being knowledgeable about his planned profession and can lift him from mere academic accomplishments into professional awareness of current developments in the area in which he will work. When a student becomes comfortable with the journals and literature of his profession, he not only begins to realize what is really going on in his area, but also gains a verbal awareness and skill regarding his profession.

One problem in an undergraduate technical writing course is the students' ignorance of the kinds of communications in which they, as professionals, will be involved. The library can act as a source of models for a large variety of different kinds of technical writing; these models can give students a sense of writing as a practical vehicle of communication rather than an abstract exercise that is basically academic. Furthermore, because few undergraduates understand the research tools of the library, a program is needed in course-related library instruction so that students can make effective use of the information stored in the library.

   B. Describe what you believe are the contributions which your library staff can make or are making to course-related library and literature use instruction.

In the past, few teachers of technical writing have had expertise in the sophisticated research tools used in scientific and technical fields. Thus, the library staff is clearly needed to provide guidance. Also, since library work obviously requires the students' physical presence in the library, a program in which the library staff is involved will make library and literature use instruction immediately available to the students.

   C. Describe what you believe is your role in a course-related instruction program.

The faculty member should plan writing and research assignments with the purpose of allowing the student to become completely comfortable in his use of the library and familiar with the many valuable resources and tools which it offers him. Clearly, the faculty member will have to make himself far more aware than normal of library facilities. He must also discover methods of making his students feel at home in a technical library.

- Dorothy Fuller

SEND COMPLETED APPLICATION TO:

THOMAS KIRK
Box E-72
Earlham College
Richmond, Indiana 47374

Draft

A Preliminary Proposal

to the

NATIONAL SCIENCE FOUNDATION

A SYSTEMS APPROACH FOR TEACHING TECHNICAL WRITING

James P. McCormick, Ph.D.
Principal Investigator

Department of Electrical Engineering
The University of Arizona
Tucson, Arizona 85721

(This document is available from the Principal Investigator at the above address.)

As actually held

SCHEDULE FOR NSF PROJECT
Course-related library and literature use instruction
in undergraduate science
October 19-22, 1976

Date-Time		Activity	Notes
Tuesday, Oct. 19	6:00 p.m.	Supper	Jones House
	7:00 p.m.	Tour of Lilly and Wildman Libraries	
	8:30 p.m.	Social hour	Kirk's
Wednesday, Oct. 20	8:00 a.m.	Breakfast	Yokefellow
	9:00 a.m.	Preliminaries (Introduction)	Wildman Library: Tom Kirk
		--Jerry Bakker - Faculty Development (FPSI)	
	9:45 a.m.	The Earlham Biology Program	
		--Role playing	
		Introduce Exercise	15 minutes: Tom Kirk
	10:00 a.m.	Coffee break	
	10:15 a.m.	Participants 3/4 hour doing exercise	
	11:00 a.m.	Review total contents of exercise	15 minutes: Tom Kirk
	11:15 a.m.	Introduce Library Exam	15 minutes: Jerry Woolpy
	11:30 a.m.	Participants work on exam question	
	12:15 p.m.	Lunch	Jones House
	1:30 p.m.	Participants work on exam question	
	2:00 p.m.	Question and answer discussion	Wildman Library: Woolpy/Kirk
	3:00 p.m.	Coffee break	
	3:20 p.m.	Other programs of course-related library instruction at Earlham:	
		--Political Science -Question and answer	10 minutes: Bob Johnston
		--Psychology -Question and answer	10 minutes: Evan Farber
		--Chemistry -Question and answer	10 minutes: Tom Kirk

Wednesday, Oct. 20	4:20 p.m.	Examine display of materials (Interviews with faculty and librarians of Earlham can be arranged)	Project LOEX
	6:00 p.m.	Supper	Jones House
	7:30 p.m.	Evaluation of library instruction --A panel discussion --Question and answer	Richard Johnson/ Jerry Woolpy/Tom Kirk (Wildman Library)
Thursday, Oct. 21	8:00 a.m.	Breakfast	Yokefellow
	9:00 a.m.	Workshop --Individual pairs to develop set of objectives and statement of tasks to be accomplished to achieve these objectives	Wildman Library
	12:15 p.m.	Lunch	Earlham Hall, East Alcove
	1:30 p.m.	Fish-bowl. Participants present their program plans to Woolpy and Kirk for critique and discussion	Wildman Library
	6:00 p.m.	Supper	Yokefellow
	8:00 p.m.	Social hour	Jerry Woolpy's
Friday, Oct. 22	8:00 a.m.	Breakfast	Yokefellow
	9:00 a.m.	Visit classes, interview Earlham faculty	Participants-- Wildman Library

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lham College materials:

1. Earlham College campus map. 2pp.

2. Who's who at the workshop. 2pp.

3. Workshop schedule. 2pp.

4. Library handbook for Lilly Library. 2pp.

5. Library handbook for Wildman Science Library. 7pp.

6. Faculty Development program--Consultant on Teaching and Learning. 1p.

7. A Learned Journal, vol. 1, no. 3. 3pp.

8. Laboratory write-up for library exercise. 1p.

9. Guided Exercise on the use of the library. 65pp.

10. Bibliography of General Reference Sources for General Biology. 15pp.

11. Objectives for library instruction in beginning biology. 2pp.

12. Simplified search strategy for undergraduate biology students. 1p.

13. Library examination instruction. 2pp.

14. Library examination questions. 9pp.

15. Student paper that answers the library examination question. 38pp.

16. Course-related instruction in psychology: Bibliography. 40pp.

17. Course-related instruction in chemistry: library assignments. 3pp.

18. Course-related instruction in chemistry: library exercises. 29pp.

19. Micro-course: Government as Information System, course outline and syllabus. 5pp.

20. Project LOEX brochure and questionnaire. 7pp.

ter for Research on Utilization of Scientific Knowledge (University of Michigan) Materials:

21. Project on Science Education in Scientific Communication. 5pp.

versity of Rhode Island:

22. Instruction materials. 19pp.

Y, Potsdam:

23. Instruction materials. 10pp.

lham College materials:

24. General Biology quiz and results. 5pp.

25. General Biology bibliography evaluation form, and evaluation results. 2pp.

26. Student attitudes towards libraries and librarians: questionnaire and results. 2pp.

27. Circulation records: per volume and per student data. 1p.

28. Circulation records: per subject data. 1p.

29. Bound periodicals use survey results. 4pp.

30. Workshop evaluation form. 2pp.

Documents from Earlham College's

NSF Sponsored Workshop on

Course-related Library Instruction in Undergraduate Science Education

ORDER FORM

Individual documents are available at 12¢/page, $1.00 minimum.

___1.	2pp.	$0.24	___16.	40pp.	$4.80
___2.	2pp.	$0.24	___17.	3pp.	$0.36
___3.	2pp.	$0.24	___18.	29pp.	$3.48
___4.	2pp.	$0.24	___19.	5pp.	$0.60
___5.	7pp.	$0.84	___20.	7pp.	$0.84
___6.	1p.	$0.12	___21.	5pp.	$0.60*
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___13.	2pp.	$0.24*	___28.	1p.	$0.12
___14.	9pp.	$1.08*	___29.	4pp.	$0.48*
___15.	38pp.	$4.56*	___30.	2pp.	$0.24

Send orders to:

Thomas Kirk
Box E-72B
Earlham College
Richmond, IN 47374

*These are included in the annual report.

Appendix IV

Schedule of Workshop and Contents of Transcript

To be able to use the transcript effectively you must have certain documents which were handed out at the workshop. The list of all documents is included in Appendix III. Included here are only the actual documents needed to understand the transcript. The documents are included at the end of the transcript and each is assigned a number. These numbers are placed in the right margin of the transcript the first time they are mentioned.

Jerry Bakker	Faculty Development and Library Instruction p. 1-5
Tom Kirk and Jerry Bakker	The Earlham Biology Program (Role Playing) p. 5-25 Introduction p. 5-9 Discussion of Guided Exercise p. 10-15 Library examination, instructions and questions p. 15-18 Discussion of examination work and student papers p. 19-25
Bob Johnson	Library Use in Political Science at Earlham p. 26-29
Evan Farber	Library Use in Introductory Psychology at Earlham p. 29-34
Tom Kirk	Library Use in Organic Chemistry at Earlham p. 34-37
Stephen Nelson	Project on Science Education in Scientific Communication p. 37
Tom Kirk and Jerry Woolpy	Evaluation of Earlham's Biology Library Instruction p. 38-45
Richard Johnson	Evaluation of Library Instruction Efforts p. 45-51

Documents referred to in text

1. A Learned Journal	pp. 52
2. Laboratory write-up for library exercise	pp. 53
3. Guided Exercise on the use of biological literature	pp. 54
4. Bibliography of General Reference Sources for Biology	pp. 55

Documents, cont.

5. Objectives for biology instruction in beginning biology pp. 56

6. Simplified search strategy for undergraduate biology students pp. 57

7. Library examination instructions and questions pp. 58

8. Student's paper in answer to examination question pp. 59

9. Selected pages from psychology bibliography pp. 60

10. .Chemistry library assignments pp. 61

11. Chemistry library exercises pp. 62

12. Project of Science Education in Scientific Communication pp. 63

13. General Biology Quiz and Results pp. 64

14. Bibliography Evaluation Form and results pp. 65

15. Library User Opinion Scale and results pp. 66

16. Bound periodical use survey results pp. 67

17. General Biology, Course Evaluation Library Component pp. 68

The Earlham Biology Program
Overview and Introduction

BAKKER: Place of bibliographic instruction within the context of faculty development. One, I think the use of a library is, for a teacher, an extension of what he or she can do with students. It offers new possibilities for teachers to lay open before students different kinds of information. It is something beyond what is available in a text or one or two reserve readings. It is an enlargement, an additional resource, either in a course or in a curriculum. That, maybe, is a traditional place for the library, but it is also traditionally ignored. It is seen most significantly at the upper levels in the curriculum where students are thought to be doing some independent work writing papers. They should be able to get to the library and use some of the resources of the library. I would like to argue that the library as an additional resource makes sense throughout the entire curriculum and therefore it is of concern for a faculty member or teacher. It is not just a concern for librarians.

Another way in which bibliographic instruction can have some significance for the faculty development is that bibilographic instruction workshops are a way of doing something with faculty, a way of making an impact on faculty, a way of providing them with a new challenge. The initial article in this (A Learned Journal) that I am passing out now is (this is a newsletter we send around - the title of course is so anyone who gives me material for this newsletter has a chance to say that he has been published in "a learned journal") on a bibliographic instruction workshop we held last January 1976. Workshops such as the one described in this lead article, I think, are a challenge to faculty, and I think that when faculty are faced with a challenge, when teachers are actually asked to do something different, that is when you have the opportunity for making a difference in teaching and in the professional life of the faculty member. It is also a way of bringing faculty together across divisional or departmental lines. The workshop which we had here last January was a very delightful time. A number of people reported saying on Friday afternoon to themselves or their wives, "Why did I ever agree to go to a workshop on Saturday?" and by Saturday afternoon, after they had been at the workshop with Evan and the rest of Farbers' friends, they recognized that they had had a pleasant time with their colleagues.

Finally, and I think most importantly, library use is justified when it makes a course more effective. You can do something through use of the library that you cannot do by any other means. If by means of the library a teacher can be a more efficient and more effective teacher for what he or she wants to do, for what the course goals are, that is the justification for what Tom Kirk is doing, and I think that is the reason why all of us are here.

I'm prepared to argue from my own personal experience that that in fact is true. In the courses that I have taught here with course objectives set before involvement with the library, I've been able to do these things more effectively by working with Tom and developing materials so that the students are using the library, doing better by the use of the library what I want them to do than I could do by lecturing or giving other kinds of assignments. The library for me is not an add on, not something nice to do when you have some spare time. Library instruction makes my teaching more efficient.

TOM: Are there questions you would like to put to Jerry?

QUESTION: Are we going to get a more in-depth look at the way you handle this within your own courses or will that come later? ANS. I'm going to do that this afternoon.

JERRY WOOLPY: I'd like to add to what Jerry has said: He talked about faculty or course development and how the library could help accomplish course objectives. It seems to me that there is another dimension of faculty development which I know Jerry supports. To some extent faculty develop themselves and improve their professional competence by continual renewal through their students. It is one of the ways of refreshing ourselves. Let's say, for me at least, that is one of the most compelling reasons to use the library. Not only am I more effective in teaching biology (I'm pretty sure that's true), but it is more interesting to me and I am learning new biology all the time. I don't have to go on sabbatical in order to learn something new about biology. And since we teach in a fairly broad range of topics, that is, we can't afford to hire someone to teach only in one area, we have to cover several areas, and therefore we go well beyond our trained expertise. We find that library use by our students is one of the ways we can keep up and broaden our perspectives.

QUESTION: Is there a librarian on the Teaching and Learning Committee?

ANSWER: There has been.

QUESTION: But at any rate this workshop (the Earlham library instruction workshop described in the attached A Learned Journal) evolved out of a committee that did not have a librarian on it? ①

ANSWER: The workshop evolved from a librarian and me sitting in the coffee shop and talking one day. The Teaching and Learning Committee is not a key element in what is going on in Faculty Development at Earlham. It doesn't have that kind of responsibility or major function.

QUESTION: What did you have in mind that could never be achieved just by other means?

ANSWER (Jerry Bakker): I didn't say "never". I said, could not be as effective. In the second term of organic chemistry we focused on aromatic organic chemistry, and I want the people not to simply treat the notion of aromaticity as a concept within that sub-specialty of Chemistry.

I want them to treat that not as something they have to learn by definition but I want them to understand that this is a working principle within chemistry. I want them to see that there are still challenges to the notion. In any text, in any secondary source, the notion is so old that it is gray bearded, it's accepted and people act as if there were no questions. When chemists are publishing in this area (organic chemists, of course, still are) they know better and they aren't confused by what the texts say, but of course the students don't find this out until they begin to read what some of the current debates are. We have designed a term paper problem where the students have to put together conflicting reports from the literature. And that drives something home about the concept of aromaticity, it drives something home about chemical research that no amount of talking will do. This is done in the second organic course which is usually taken in the sophomore or junior year. They don't have to wait until they are seniors to gain this kind of perspective, and they do it and they do it well.

QUESTION: How many hours of library instruction do those students get?

ANSWER: (Jerry B.) Probably on the order of two class hours, plus three walking exercises, and previous experience in at least one chemistry course, and maybe one chemistry and one biology courses. (Tom) From my perspective their experience is uneven from one student to the other. Because the curriculum is not rigidly sequential. One of the limitations of the course related instruction as a way of doing things is that you can never be sure that every student is going through the program the same way. They miss something, and I think chemistry students in Chem 51 (which is the number for this course) may or may not have had General Biology. If they have not had General Biology, they may be missing some basic skills of bibliographic organization that we don't cover because so much of our focus is on meeting their specific needs in the elementary organic chemistry course. But they will have had some kinds of experiences before they come to Chem 51. They will then get some instruction in 51.

QUESTION: If you were going to do this specifically looking at it from Chem 51, what is the minimal amount of library instruction you can get away with and still have these kids competent to go produce the kinds of papers Jerry wants them to produce? I'm asking for the minimal.

ANSWER (Tom): A student who has gone through general biology and then through Chem 13, I consider that to be an optimum. I'm not sure whether that is minimum or optimum.

QUESTION: I prefer you took it for the kid who didn't have biology and didn't have Chem. You go from scratch up to writing Jerry's paper.

ANSWER (Tom): That's a lot of hours. I'm not sure what the answer is. I can't answer that. (Jerry W.) But he would have had to have taken Chem 13 in order to get into this. So he would have had to have at least one previous course.

QUESTION: Let me put the question this way. Are you saying that by the time he finishes the library instruction in this course, this will be the third time through, so that it will not be two hours of instruction but six hours of instruction, and 9 hours of walk-through?

ANSWER (Tom): It could be as much as the fourth or fifth time in this college.

QUESTION: Is this compulsory?

ANSWER (Tom): 51 is compulsory for a chemistry major. Perhaps we could take a look at the total curriculum of the college if you are interested in this and see where library instruction occurs. Maybe this would be a good time to do that. The college has approximately 18 credits of distribution requirements. QUESTION: What is a credit? ANSWER: A credit is 3.3 semester hours.

ANSWER (Tom): About half of their undergraduate education (36 credits) is distribution requirements. In that there are two English composition courses. One of those has library instruction, and everybody takes that. There is a philosophy/religion requirement (this is the academic study of religion or a basic philosophy course) and they will probably get instruction in one of those. There is a political science/economics requirement, and they will probably get to use the library once there. There is a psychology/sociology requirement, and they may, especially if they get into psychology, will use the library there. Then there is a 4 credit science requirement of which about 3/4 of all students take the basic biology sequence (2 courses) and they will get instruction in 2 of those. The other typical courses are in geology and astronomy, and they will get library use there also, and there is a language requirement and there is no instruction there.

QUESTION: You don't have an audio-visual language lab?

ANSWER (Tom): Yes, we do have, but it serves primarily as a practice - drill center. They do very little with the literature, and they don't do research in the literature of the language. There is a two credit history requirement. They do not use the library in the first term, and the second term varies; some do and some do not. You can see the amount of exposure students are going to get through the curriculum. In possibly 8 out of the 18 they will get some kind of library use and library discussion.

QUESTION: How extensive is this, can you say briefly? In these various courses?

ANSWER (Tom): In most cases it will consist of a bibliography of the major reference tools and some kind of presentation to the class. Now that's the old pattern, the established pattern, that we have used, but it is breaking down because we are getting more sophisticated about what we are doing. We are using alternative assignments; we're working it more into the course design so that when a faculty member starts to draw up an assignment, the librarian is there working with the faculty member to develop and shape the assignments to include library use. In these newer situations it is very difficult to separate library instruction from the course and its instruction.

QUESTION: It really happens this way? You don't just pay lip service to this?

ANSWER (Jerry W.) I think it really does happen this way, and one of the reasons I think that it does, is that our librarians are full citizens. That is, they are considered in terms of governance of the College to be the equivalent of faculty members and participate in all aspects of the college. They are some of the most highly respected members of the community, and I think that is one of the essential ingredients in the interchange. When we have a discussion between a faculty member and a librarian, it is really getting two faculty members together. There isn't a distinction. It is real give and take. It is not inviting someone to perform a service in which the teacher assumes that he has all the information that he wants and the librarian is just going to be invited in to do something. I think there is a great deal of respect, going both ways, and that might be one of the keys of our success.

(Tom): Perhaps this is enough of an overview, in a sense, of raising some questions in your mind. Talking about how students get instruction, or what we do, leads to what we're most about today. If I could structure the workshop in terms of its general function, I would say that today is delivery of information to the participants. We are probably going to tell you much more than you want to know about how one program operates. I hope you get inside it and see how it works; take it apart, put it back together again, and infer from it some of the general characteristics which tend to suggest the reasons for success. But while you are doing that, you ought to be thinking about your own program. As we said in the proposal, "While much can be learned from the experience of Earlham and other institutions, each institution, and more precisely each department must develop a program which complements their own program and curriculum" and we really mean that. But when we give you another snow job about our program, think in terms of how well we are doing what we are doing, please take it with a grain of salt. What were our objectives; do those objectives make sense in terms of your program or are they really off base? Perhaps you have other objectives, and therefore your program should be totally different. We want you to look at our program, be critical and think about what your own program might look like. What little bits and pieces of information can you get from what we are doing that will be helpful?

The way that we are going to present our program this morning is to do a little role playing. We are setting you up as students at Earlham, you are freshman students coming into Earlham College, and we'd like you to forget everything you know about using libraries, as much as possible. Try and think back to what it might have been like to be a freshman in college. I was interested in Steve Nelson's comment last night that a teaching faculty member, a very good teacher, said that in his teaching he always tried to think of what it was like to be a student and not know the information. So if you could try and put yourself in that position...

JERRY: I want to say something. Well, I want to say that you are students in my class and Tom is the librarian and he is coming to class today, and I want to introduce him at the point we are ready.

TOM: Now to set this up. This is a course which was called General Biology and is now called Ecological Biology. It is the first course in the biology curriculum of the college. It is a heavily enrolled course, it has two lecture slots a week, and then everybody is assigned to a lab section which is taught by a full professor and a student lab assistant. There are from 7 to 9 sections depending on the total number of students which will run from 180 at the lowest to the highest enrollment we have ever had, this fall of 273, which is unfortunately a very large number for a so called small liberal arts college. O.K., the instruction, the initial part of the instruction, is done through the laboratory sections, so today you are in a three hour laboratory block, and it is a regular laboratory period. I am coming to that laboratory section.

JERRY: We have completed about two weeks of the course, and you have read 100 pages or so of the text, done a couple of laboratories, gone outside and sampled the density and diversity of trees in a plot of land and written up a lab report on it. You are beginning to have some feeling for biology, but it is awfully complicated and the course is hard, and the expectations are not all that clear. There is going to be an hour test next week and you are not even sure what is going to be on it. In the last couple of weeks I hope you have come to understand science as acumulative discipline, as a discipline that builds on itself. You have realized, or I hope you have realized, that it is a series of generations of testable hypotheses, tested and then interpreted with additional hypotheses, so there is a kind of network enterprise. Science proceeds by making some kind of a guess about the nature of the universe, then trying to test that guess. Now, we have talked about that network as a kind of abstract body of knowledge, almost as though it were an oral tradition, but in fact it is not an oral tradition, it is a written tradition, and its basis is the library. That is, we don't simply generate hypotheses from looking at data; we have to look at what is known and what is thought about what is known. The archives for that is the library. So, if you look at a scientific paper you notice that the introduction begins often with a hypothesis that is based upon justification citing literature which has gone before. Let us look at a scientific paper. (At this point I would probably have one for you or refer you to one, and focus on the introduction of this paper, and how it is constructed.) You see that the hypothesis is justified by previous literature in which you begin to see that there is a network from one paper to the next paper, to the next paper, to the next paper, to the next paper. It is not a chain but a web of information, and if you are going to participate in this enterprise you've got to tie into the network, which means you've got to get into the library. So that is what we are about to do, to introduce you to some techniques of getting into the network, of getting into the library. I think that you are going to find this at first tedious but perhaps one of the most important dimensions of this course, and the part of the course that seems to be remembered most by people who have taken it. If it doesn't seem like it makes sense, be a little bit patient, because I think you are going to find it extremely powerful and I think you are going to like it although you are going to be mad at us at first. But please listen to Tom, and then do what he says. It will take about three to five hours and pretty soon you are going to be glad you did this, although maybe you won't. Tell me, let me know how you feel about it, and I will try to help you to be comfortable with it. O.K. Tom.

TOM: Thank you, Jerry, the first thing I want to give you is a lab ② sheet (see laboratory write up for library exercise) which indicates a little bit about the nuts and bolts of what we are about today in laboratory. I'd like you to pay particular attention to the points 1,2,3,4,5 which are there in the middle part of the page where we have indicated what the objectives are of the instruction that we are doing this week in laboratory. Now these may seem very simple, by their shortness. That is deceiving, especially because points no. 4 and 5 are quite complicated, and I suspect that you have never heard of those titles before. (If I may step out of my role for just a minute to say that I asked the students this fall how many of the students knew about Biological Abstracts and Science Citation Index, only one freshman had heard of either, although the upperclassmen interestingly enough who were not science majors, did know about them. Underground of some kind!) As you can see from the handout, and as we have announced in lecture, you were supposed to go to the bookstore and pick up your library packet(see "Guided Exercises") ③ and I suspect that a lot of you did not go to the library and get these. I have some extra copies here which I will sell to you for $1.25, as they do in the bookstore. (Now those packets would normally also include two other things, the handbook for the Wildman Science Library which you already have, and also a copy of a bibliography (see Bibliography of General Reference Sources for Biology). ④

About a week from now you are going to be given a question. A question like: "What do owls eat? How do you know what they eat?" And you're going to have to go to the library and find information on the topic. Not only are you going to have to find information on the topic , you're going to have to document everything you say by using primary journal literature. You may never have thought about writing a paper of that type, but that is the central part of the course in terms of relating the use of the library to the process of science. We don't want to make using the library difficult while you are doing that paper because you are going to be graded on the paper, on the bibliography, the content and the way you put together your arguments. We want to separate learning to use the library from that paper so that when you go into the research on that paper you are already familiar with using the library to a certain extent. So what we have done, we have prepared for you a simulation of a research process and the Guided Exercise in your packets is that simulation. It's in a programmed format which permits you to go into the library to work through the exercise and at each point where you give an answer to a question, you get a model answer with which to compare your answer. Actually there are three different Guided Exercises in three different subject areas. The only reason for the difference in subjects is to spread you out in the library so you aren't all using the same sources. If we could turn to the first page of the exercise, there is some basic background information about the topic you are going to be working on. The question that is being asked, and the simulation of the research that is the focus of the exercise, is on this first page. Then on the second page is the beginning of the exercise itself. What happens is that you are given a statement which either defines terms or gives some factual information. You are given instructions to do something and then you are asked a question. You are to attempt to answer the question. Then on the next page (in this case, page 3) in italics is a correct or nearly correct answer to the question, and you are able to check. What you should do is write down your answer in the Guided Exercise. If it is correct, you can continue to the next part of the exercise. If it is wrong, you go back and try to figure out why it is wrong. What is the difficulty? What are you interpreting incorrectly? What kind of problems are you having? If you cannot figure that our quickly, you should come and ask one of the librarians for help, either myself or one of the student reference assistants. They'll try to help you figure out why you did not get the right answer.

You start through the exercise and work it at your own speed. We recommend that you not try and do the whole exercise at one time. It is somewhat tedious and it's complex. As you notice from the cover, it is in five sections. Each section is a logical unit which can be done in a time period of an hour to an hour and one-half. We suggest you do one or two sections a day through the next week until you have completed it. Your assignment for this laboratory period is to complete the exercise, turn in your responses to all the questions and then take a 15 minute quiz which covers some of the major points in the exercise. There is no grading for this. All the information of how well you did on the quiz and the answers you give to the questions, are all the property of the library. The faculty member never sees them. The faculty member will find out if you did not complete the exercise.

Grades on the quiz are not part of the course. The grading on library use will come indirectly in the evaluation of the bibliography and the papers you are doing later. (At this point we would turn the students loose. Some of them would go to the library to work on the exercise. Everybody can't start at the same time, and normally speaking, students would do this in sequential order. We would simply tell them that just because they have been left off from lab (they are only in lab about three quarters of an hour) doesn't mean that the lab this week is easy or short. It simply means the time has been moved and spread out through out the week. But they should be ready when planning the schedules to allow 3 to 5 hours to do the exercises. Now what we'd like you to do at this point is to go around the room and assign you to start at different points in the exercise, and we will give you a chance to work on it, after you have had a chance to have a little coffee. I'll let you work on it for about one-half hour to about 45 minutes. You should start at the beginning of a section and you should work that section. That should give you some flavor as to what is going on in the exercise. At 11:00 we will come back together again and we will go through the basic content of the entire exercise (this outline form) so you can see what the total content is. Then right before lunch we will give you a library examination question to work on, and you are going to apply the strategy in the exercise to find information to answer the question.)

This is a learning experience. You're to get as much out of it as you possibly can because it is going to pay off next week when you get your library exam question.

JERRY W: When we give you the questions before noon, we are going to tell you to work together, share as much information as you can even though we expect you to write your own paper.

JERRY W: Have respect for the books and the fact that others are sharing them.

TOM: Be patient when the book you want is not on the shelf, and don't reshelve it.

[The participants worked on one section of the exercise for about an hour. Then the group reconvened to review the entire contents of the Guided Exercise.]

The Content of the Guided Exercise for Locating Biological Literature. ③

TOM: The objectives of the program are stated in the two page handout Objectives for Library Instruction in Beginning Biology, and the search strategy of the Guided Exercise is summarized in Figure 1, Simplified Strategy for Undergraduate Biology Students. ⑤ ⑥

Section 1 of the exercise is the start-search, and covers the use of the McGraw Hill Encyclopedia of Science and Technology and/or the text, Bibliography included, and Use the author approach to the card catalog boxes. Section 2 covers the use of the subject approach in the card catalog, and that part below it, Does the library have relevant material?, and Ask the reference librarian for help. This point is made at several places in the exercise. Section 3 of the Exercise, The Review Serials, is off to the side on the flow chart. Sections 4 and 5 are Science Citattion Index and Biological Abstracts. I find flow charts to be useful in some ways, but they are deceptive in others because they make the system seem simpler than it really is. For the student at this level, I think the simplication is all right, and I hope you will keep in mind that these are by and large freshman, in their first term of college, and they are predominately nonscience majors. Those who are science majors will get more sophisticated instruction in upper level courses. This exercise would be the science equivalent to an introductory lecture on how to use the library, except it is geared specifically to the science and general biology literature.

QUESTION: Are these specific, for example, this one dealing with chromosone mapping, gene mapping, is this tied directly to something you specifically do in the course?

ANSWER: No. Ideally that would be desirable. The General Biology course, when it was taught as a survey course covered basic concepts in biology. In the first three or four weeks when they do the exercise the area of ecology is covered. In order to get people spread out in the library, in terms of using different tools, and getting them physically separated, we can't have them all in a very narrow subject area. Therefore, having all the exercises in ecology doesn't make sense. That's why we have three exercises: genetics, ecology, and physiology/ behavior. They don't relate well to the subject content of the course, which they might ideally do. If you had a small upper class course with 30-40 students, you could do that. If you had a genetics course or microbiology course, or some sort of engineering course, or organic chemistry course, you could develop assignments specific to the subject matter of that course.

JERRY WOOLPY: One thing you've got to recognize, we've been at this for a long time, and this has evolved a bit. We started out doing all of this with an oral presentation, and it worked. It just was very inefficient. What I'm cautioning you against is the feeling that you have to have this kind of support in order to do the program. You don't. You can evolve it.

TOM: Jerry was telling me this morning he was talking to the faculty here last evening about where we started, and he suggested we take you on a guided tour of the original science library facilities. The librarians didn't hear that, but when we started this program, we were on the fourth floor of the old science building, and the elevator only goes to the third floor. There were 800 square feet of floor space, room for 2,000-3,000 volumes, and about 20 people. That is all we had. We did it. Now, in retrospect we don't know how we did it. You start where you are and you go as your resources and your time allow. What you've seen, as Jerry suggested, is the result of 10 years of evolution of the enterprise.

QUESTION: Do you feel that you're missing a lot because you are no longer making those person to person presentations or person to class presentations, or do you think this really is that much better?

ANSWER: I do have direct personal contact with each lab session, just as I did with you this morning, for about half an hour, when I explain how to use the exercise, and the philosophy of library instruction as part of their general education.

QUESTION: Isn't it possible to give the introduction to all of the students at once?

ANSWER: Our method is a little inefficient, but the problem is that we don't want everybody starting in the library at the same time. We like to keep the thing in a tight sequence because the timing is important. It doesn't do any good for me to go in and talk about the philosophy of using the library three weeks before they get to the exercise.

JERRY: My guess is that this presentation to a group of 25-30 students that Tom makes is largely a ritual. Very little comes across at that time. It is just kind of setting the scene. He tells them a lot of substantive information, most of which doesn't stick.

TOM: They don't believe it for one thing.

JERRY: Right! They don't attend to it particularly, but it is necessary that we get some introduction, and say, "Here's Tom Kirk." This works - this kind of thing you just went through, particularly when it is followed up directly with an assignment.

QUESTION: One thing we are doing a little differently; we were bringing classes into the science library and actually lay out on the table examples of dictionaries, encyclopedias, indexes, handbooks, and guides to literature before they started, so they knew the difference between an index and a guide to the literature. It was just a sampling of different kinds. It gave them an introduction to what the things were before they started looking up their projects.

TOM: I'd be interested in your assessment of the ability of those students to follow the abstraction, that is the concept of the encyclopedia, and the concept of the index or abstracting service. The exercise deliberately avoids too much reference to that. It attempts to deal with specific tools and our experience is that freshman are not capable of thinking about search strategy in terms of this flow chart, at this introductory level. Now we do use this flow chart with the second term General Biology course when we do some advanced instruction. That is when we try to introduce the ideas of reference tool categories: encyclopedias, dictionaries, bibliographies, annual reviews, index and abstract materials, and how you select the appropriate tool in that category given your special topic.

WARREN: I have been sitting here thinking to myself, and I may be all wacky, that you have got the cart before the horse, that in fact, as Jerry said, the fundamental information, is the original journal literature, and I think you are concealing this fact, the secondary and tertiary sources are regurgitated, digested. The prime sources are the journals, and you might even tell them what the referee process is all about. Then we have these aids to accessing that information which are abstracts, dictionaries, handbooks, etc.

JERRY: Yes, we teach them how to write a lab report at the same time we are doing this. We are building that together and we really make the distinction between primary and secondary sources, and that is very important in all the different sections of this course. The cart before the horse is also true. They didn't ask you, how do I find the information, we tell them, and we do a lot of that. But we are trying to get the question closer to the answer and that's why we follow this up directly with the question. That's why we call what we are doing an exam.

TOM: I think one thing we did not mention though is subject matter knowledge, in other words, the students can't get to the literature because they don't know the subject, so they have to read the encyclopedia.

WARREN: Oh, sure, how you access this vast fund of refereed knowledge is the problem you librarians are dealing with. But as a scientist, I sit here and say, "I don't care how you get to it, but I don't want a sight review of articles. I want an original paper, with cited original literature."

PARTICIPANT: In other words, if you want a transition, the students come and they first have lectures on a subject and those subjects are about what was done in the primary literature. It was researched and put into the primary literature. That is how it happened, and then you are going to make a transition from that to how to find it. You feel that you should make a psychologically logical transition. Is that what you are talking about?

WARREN: No, it struck me that concealing from the freshman the fact that the fundamental prime source of information and the information that we are trying to retrieve, that stuff is written in refereed journals. The game we are playing is how you get to it.

TOM: I think it may have the affect of concealing it, although I don't think it comes across that way because in the assignment which Jerry is about to give you, we do make the point that what they should be after is the journal literature. When I introduce the exercise, I ask the question, "What do owl's eat"? and I say, you are going to have to defend your answer with primary literature, and I probably don't go on to say, which is what you would like to hear me say, is that all these other sources are only ways to get to primary literature.

LEO: I think the key ideally is to help everyone get to the primary literature, but I think that you simply can't dump that on people. I like the graded approach. That to me is one of the reasons I was interested in this particular problem, because the graded approach will work even with graduate students. I simply cannot go into an area where the students lack familiarity and can not read critically. I think the important thing is critical evaluation by the students, and I think the only way to get there is through a graded series. He has to learn to crawl before he can walk, and we have seen many examples of this, so let's not be too hung up on getting the student into the Journal of Molecular Biology, let's get him into the library first. The way of getting him into the Journal of Molecular Biology may vary from student to student, ideally we want him there, but there are just a lot of students who never get there. As a microbiologist, the student will eventually get to the primary source, but if one of my students has a question in astronomy or if he has a question on some social science, he is never going to make it to the primary literature, but at least I want him to get through the secondary and tertiary literature, and if we can show him that in a microbiological setting I want him to be able to do an astronomy or sociological problem. I don't think that our objective should be the referee articles, I think our objective here should be what programs can we develop to allow the students to use the library effectively in many different contexts.

WARREN: I may be taking an extreme position, and there is a point that you left out, and that is the reviews like the annual reviews and the multivolume series (i.e. The Enzymes) are written by experts in the field who have sifted the literature and have done a lot of the work for the student. We ought not to jump over that, or around that or subvert it, but use it.

TOM: Are there any more questions about the general objectives on that two page sheet? Jerry is going to play his role again as a faculty member and give you your library examination question, have you work on it awhile before lunch, then after lunch. See if you can apply what you have learned in the exercise, and what we have also shown you in this summary of the exercise. Are there any more questions about the objectives and basic coverage and content?

JERRY: I think we should keep in mind that this is a small enough group so that we can stop and go over anything, give and take is really more important than the meager offerings that we have for you even though we are pretending that they are highly significant, so please stop us.

PARTICIPANT: These offerings are not meager.

TOM: I want to reinforce what Jerry has said. We are small enough program and the kinds of excursions that we have had are very important, and there must be time for that kind of thing.

JERRY: First thing I am passing around is a cover sheet which every student gets. Then, I will pass around specific questions that will only be relevant to my section. Everybody in the course gets this cover sheet and I attach to that a separate sheet of questions peculiar to my section. This thing was put together by the staff of the course. You have spent a week on the Guided Exercise that you just did, and this is a week after Tom came in and made that presentation. You have completed the Exercise, and you have taken your quiz, and so forth. Now you are ready to use this information. The second page is simply to say that we want carbon copies that you are going to turn in and that the carbon copy should not have your name on it, because we are going to pass it around the class. Students who have worked on the same question that you have will read your paper and make marginal comments and grade it. The instructor will do this too. ⑦

QUESTION: How long have you been doing that?

JERRY: About six years.

QUESTION: I noticed that you only let about four students do it. How well do grades that the four students give correlate with the instructor's?

JERRY: They are consistently lower. I make the bargain with them that if their grades are higher than mine, then I will raise the grade and I have to raise about one in twenty. Their comments are much more critical than mine. That is they really get after each other about detail, and many times they have read the same source material.

QUESTION: What kind of exposure do they have to the style manual?

JERRY: We tell them that it is on reserve, and they have to use it, and as you will see in this thing I am going to pass out, I give them some guidelines in addition to that. They do this type of exam four times, that is four times over a period of 20 weeks, and by the time they have done it four times, their style is correct. The first time it is kind of messy, the second time it is better, and so on.

TOM: We should say that what we are going to do is approximate the ideal and each time they do it better. First time it is really terrible, but they get better as they do others.

JERRY: They really do, and we think the repetition of this assignment is crucial. This is not something you can do once. It needs to be done at least twice, and I think more, although my colleagues would quarrel with that. Now I am going to pass out to you a set of questions from me to my class and a set of questions from one of my colleagues to his class. Both of these were stapled to this one that was passed out originally. First of all, I am passing out my colleagues questions, and I want you to focus on these these are actually the ones on which you are going to work. I am going to pass out mine and point out the difference. Now you may pick one of these four questions and work on it. We also have the students' results, because we have the papers that were generated by these questions. Take one, and you, like I say, use all the resources available to you including your fellow students and other instructors from other sections. We are sitting on the same side of the desk, in other words, we are working together. Let me show you my version which I think you will see right off is quite different although it is the same assignment. This gives you some idea of the variation you can do. O.K., I have written some notes on them. I'm not sure Bill Harvey doesn't say the same things in class as I have written out. I really wasn't intending to call your attention to that as much as I was the different style of questions. As I see it, the difference between my questions and Bill Harvey's questions are that the answers to my questions could not be found in a textbook. You might find an answer, but it would not be adequate. They are frontier kinds of questions, you have to go to the journal literature, and you are not even going to find satisfactory answers in the journal literature, but at least you are going to be able to approximate the answers. They are harder questions, broader issues and more scientific theory. The others are more specific. I am not sure which ones are better, but they are clearly different. Bill's questions could be answered adequately from the textbook, even though he would not accept the answer unless they used primary sources.

TOM: There is also probably an "answer" to Bill's questions, while the answer to Jerry's may be more open-ended. That's because they are closer to the frontier.

QUESTION: Students do one out of four?

TOM: That's right.

JERRY: And one out of three in my section.

QUESTION: Are your questions usually based on something that you have done in your laboratory?

JERRY: Yes, that's right.

QUESTION: How about the other questions?

JERRY: No, they might have read something about it, but they are not right out of the reading. I am trying to base my questions on experience that they have had in lecture, reading, or something like that. The first question is actually field experience.

TOM: Maybe a little bit of background here would be helpful. The course as it was originally designed several years ago attempted to work at getting students to put together the relationships in the process: question the literature, develop a hypothesis, and the experimentation, and then write up the results. We have had long staff discussions about this, and about how to achieve it successfully. I think everybody agrees that we have not done a successful job. Some of us, I include myself at this point, are not sure it is appropriate to try it with freshman, and others, I think Jerry is one of those who thinks we should keep trying. Maybe we can make a breakthrough if we keep putting our mind to it. There is a difference of opinion among the staff as to how well we might achieve the integration of library use, hypothesis development, experimental design, execution of the experiment, analysis of the data, and write-up of the conclusions. Jerry is attempting to do that more with his kind of question than is evident with Bill Harvey's kind of questions.

QUESTION: Both are effective. I am not quite sure what correlation there is in what you are trying to do, but I have a question, "What is the nature of the student you have at Earlham, academically? What are your admission requirements?

JERRY: Well, I cannot give you actual numbers. Their SAT scores are middle-ish, they are not extremely high, and some of them are risk scores.

QUESTION? What are risk scores?

JERRY: 300

QUESTION: What is middle-ish?

JERRY: 1000; 450 to 500 each.

QUESTION: What is the total?

JERRY: Most of our students run in the area of 900 to 1000.

QUESTION: What fraction of your student body is pre-med?

JERRY: We have between 10 and 20 applicants per year, per class.

QUESTION: You mean students applying to medical school?

JERRY: That's right, in a graduating class of 200-225. We have more initial interest and of those we usually get 5 or 6 or 8 into medical school. I think we get every student into medical school who was qualified. I have never felt that we were short changed by the medical schools. Not to say that I didn't think it would be nice if so and so got in, but it is clear from their record that they are not going to. If we get a student with good grades, and MCAT scores, they will get in. I think it is important to say that our undergraduate biology and chemistry programs are not overbalanced by pre-med students.

WARREN: I am sorry, but we have this fantastic cutthroat competition among students and this colors the way they go about doing their jobs. They will hide the books in the library, tear the pages out.

PARTICIPANT: That rarely happens, and when it happens, it cannot be attributed to pre-med, but attribute it to people who are trying to imitate the adult system.

JERRY: You will have a week to write a five page essay in response to those questions, any one of those questions. If you are thinking about it, and want to try your ideas on me, or on anyone else on the staff, I think it might be a good idea. If you feel you know what you are doing, go ahead and write your paper. You probably won't be able to find me any next week, but if you do, I will help you. If you con't find me, call me, as I would like to be more helpful than I probably will be. Write the paper, get excited about it, have a really good experience.

QUESTION: Can one choose your questions or Bill's?

JERRY: No, my students must do one of mine, and Bill's must do one of his four. If a student were to come to me, and say, I want to do the following question which I have written myself, I might edit the question a little bit and let him go ahead and do it. I wouldn't encourage that on the first exam, but I would encourage it later. If a student came to me on the first round with a good question, I'd surely use it. One of the reasons that I prefer not to have too many choices is this reading each other's papers, and the more diverse the questions, the greater number of questions, the less cooperation we have and less feedback from each other. After all, I have to read 25 to 30 papers. I can't give them the kind of attention that they can give four. Also, the fact that I don't know as much about it as they do, probably because they have just read the literature. Not to say that I don't know something about it, but I am not beyond giving questions to which I don't have a very good answer.

TOM: We would like to see what you do. Pick a question you don't know much about and pursue this as if you were a student. Later we are going to show you some papers that students actually did to give you some idea of what kinds of products we get from this kind of experience. O.K., we have lunch in about 15 or 20 minutes, and so all you are going to get to do now is think it through a little bit, and get a look at some of your tertiary and secondary sources and then after lunch have some time for you to really try to get into journal literature.

[After spending about an hour working on their topics, (one which the participants had selected from the list of Library Examination questions) the group reconvened to discuss their experiences and ask questions.]

Tom: What we'd like to do now, first, I'm going to pass around copies of selected student answers to these questions. These are ungraded samples which were just received last week, and the faculty hasn't even finished reading them yet. I've looked them over a little bit. There is no question that they are some of the better ones. You are not seeing the poorest ones, but I don't think you are seeing the best ones either. I went through 15 or 20 of them and picked out three of the better ones. I have them here. I will pass them around and let you take the copy for the one on which you were working. These papers are to give you some kind of feeling as to what students can do as a result of what they have been through. What I'd like to do at this point is to open things up to all kinds of discussion and questions that arise from what you've been doing this morning and this afternoon.

Question: I'd like to ask an opinion. I'm asking the kids who are writing chemistry papers this semester to put in their footnotes, in square brackets, where they found out about their articles.

Tom: That would be a very effective way of studying use patterns.

Answer from group: I just did that in my copy of a student's paper. I know what this student didn't do, right away. He did not follow the route that I followed, and I am going to criticize this paper if you don't mind. The student looked up bats; he did not look up pollination of flowers by bats, not by insects or birds, or what have you. There are certain tropical plants that are pollinated by bats. So I went to the encyclopedia which is an idea that I got out of the handout sheet that was given to us.

Tom: Let me interrupt right here. One of the things we think we have to do is to uneducate the students to a great extent about the bad habits they have developed in high school from poor instruction. Now go ahead.

Participant: I read through the article in the encyclopedia very quickly and there was a paragraph on bats doing this, and there was a reference to a German translation by a guy named Wartz, or something, in the year 1906, two volumes on pollination, from the phenomenological point of view, not animal reasons, but the phenomenon that was accomplished. In your card catalog, they had that 1906 volume; they didn't have another volume that was referenced. I then looked up pollination in the card catalog and got some others. One was a 1972 book called, Pollination of Flowers by Proctor and Guild. It gives you the genus and species of bats that do the job and the flowers on which they do it, and then you can go into Biological Abstracts to see if there is any other stuff.

Jerry: But can you trust that source?

Participant: Yes, this guide gives references. This is original literature. I haven't read the original literature. Look, I have only worked on this problem for one half hour, and I think that as far as a person who knew nothing about bats or flowers or pollination, I've learned my library skills fairly well. The point is that I could look at the bibliography that this girl has written and she doesn't refer to any of the papers which I have references to, and it's all bat oriented, and as I said, not phenomenologically oriented.

[The group discussed various ways in which the problem of bat pollination might be researched: 1) by pollinating bats, 2) by flowers pollinated by bats, or 3) phenomenologically.]

Participant: I think this is what the critiquing by the other students points out to each student. There is more than one way of attacking the problem and maybe I didn't use the right one this time, but I got some direction. In other words I used the vehicle instead of the process, now next time I will look for the process instead of the vehicle.

Another participant: You look to see which is more important, or which will get you there the fastest.

Participant: Yes, I will have to guess as a freshman which might be the most productive.

Participant: I took the territoriality question because I thought it was something that would be of interest to me. After taking it, I read the question again and I decided that I was going to play a game with the instructor which is the way you get grades when you're a freshman. I noticed he asked a number of questions so I purposefully looked at a number of different systems so I could find the one which would give me all the answers he wanted in one system, and that is what this student has done. I think I could satisfactorily answer his question by picking the right system. That wouldn't give me the generalizations that I would like to know about territorality, but it would give me answers to those questions and I think that is what a freshman might do. I would not like to see my students do that particularly but I think that might get me the "A".

Jerry: I think no matter what level we are working at there are going to be a certain number of students who are going to try and play the game. I don't know how to get around this entirely. I imagine every system can be beaten by someone at sometime.

Participant: I don't think it is a good question - beating the system - because I'm certainly going to learn something to be able to write a paper. But in doing this I decided that a lot of the students I deal with were perfectly correct in their sense of frustration in using some of the abstract journals. The first thing, of course, is that they learn their question is large and they have to narrow it down as in question 4 where you've asked them to discuss it from the point of view of the single species or single animal or bird or whatever. This is actually what you have to do because you soon find out, I would imagine looking at a lot of these questions, that the amount of literature is so vast that you have to do this narrowing down process quite early. One of the tricks (at least in working in a library about this size) is to look through all the literature that is in the abstracted journals, and pick out the references that are contained in journals that you know are going to be here so you will have something to read.

Tom: There is an awful lot of game playing if you want to call it that.

Participant: I mean you choose; you discount all the Russian language things, and probably all the foreign language things, and then you choose things that look as if they might be here, like Behavior, Animal Behavior, Auk, American Midland Naturalist, etc.

Another participant: That's not really game playing though, that's just working within the boundaries of the assignment.

Participant: Of course. The other thing you find is that Biological Abstract is frustrating to work with, more so than Science Citation Index, for example. All you really get is a number with a very short, short title. It doesn't really tell you an awful lot. You really do have to look at the abstract to decide whether they are going to be appropriate or relevant.

Participant: For freshmen, I think Biological and Agricultural Index would be the easiest. Of course it doesn't cover as much.

Participant: I wonder where the overview comes though. It seem to me that the freshman who doesn't know anything had better find out if anyone else has written something in general about it.

Another participant: You do. The first thing is to put ourselves in the place of the student. You know a lot more already and you naturally do things that you know are going to get results. The first thing you do is go to the card catalog and look up the word that is in the question - Territoriality. You find right away that book by Ardrey, Territorial Imperitive.

Participant: Did your student do that?

Another participant: No

Participant: Our student didn't use the authoritative book that was listed in Brittanica that you have here. It was not on this bibliography.

Another Participant: What is that?

Participant: It came out in 1942. Elton.

Another participant: This may not be significant because the student in this case chose a particular species of bird that lives in Africa and that bird may not have been mentioned in Elton. Another question arises: you go look in some of the more general things like encyclopedias and then you go get these books from the shelf and immediately find surrounding them, other books that are useful.

Participant: Another point I wanted to bring out is that in a number of these indexing and abstracting services, the approach is by particular genus-species, which is why it is necessary sometimes to use that approach.

Tom: It is only the handle for a search, as opposed to a concept term. With a concept term you have related terms and numerous synonyms which make the search difficult.

Participant: This is a paper in response to the first assignment?

Tom: That's right. These were completed last week. To give you a little biographical information the prescribed burning question was done by a first term freshman. Obviously the student didn't make as effective use of the Science Citation Index or an abstracting service as she might. There are an awful lot of secondary sources and old ones at that. Almost all of her research is restricted to the Journal of Forestry. The articles are probably not all that bad, but it is not a prestige referred journal like the Journal of Molecular Biology or the Journal of Biological Chemistry or something like that. The author of the lemming question answer, Steve, is a freshman also. The author of the territoriality question on the golden winged sunbird is an upper class political science major.

Participant: [Referring to the paper on the golden winged sunbird] I thought that was pretty sophisticated writing. He is to be commended.

Tom: Becky's is on bat pollination; she's a freshman.

Participant: She has done a marvelous job. This is beautiful.

Question: Did you say you have some returns on your questions? [Referring to Jerry's Library Examination Question.]

Jerry: Yes, I have got them, but I have not read them yet. I have the whole batch here, and you can look at what you want.

Tom: This will be a more representative sample of what the students have done and it will be interesting to see how many of them did not rely on primary sources. I think it is fair to say that on the first library exam question the bibliographies tend to be much more based on secondary sources; they don't believe it when we tell them we are going to look at the bibliography.

Response: You are just going to count it, aren't you? (said facetiously)

Tom: No, no, no. We look at the sources; we try to make some judgement. Someone said earlier this particular paper, on lemmings, did not refer to Elton's classic work. We don't look too much for the classic kind of thing at this level. For an upper class course where the faculty member is teaching in an area they might feel more competent at, they do evaluate bibiliographies in terms of key works. But for this course we are not so concerned with whether the classic works are there, but whether or not the sources themselves are generally considered to be reputable. Are they referred primary source journals? Are the books recent ones as opposed to ones that are old and obviously out of date?

Jerry: I haven't even looked at who handed them in and who didn't, so this is an impartial sample, but what I see happening in this sort of exercise is the students are developing an understanding of science. I think that is very important! They also learn something about diversity and ecology, but I suspect they will forget that. They may not forget the other. If someone says they are having trouble, I say bring in everything you've got and let's sit down.

Participant: What do you do when the student doesn't really answer the question? Like this one...he has written a very nice paper, but it is a little wide of the mark, in my opinion. I read the question. "Describe the pollination of two species of plants by bats. Discuss the structural aspects of the relationship." The way I interpret this is that they are asking for descriptions of the structural adaptations the plant has to have in order to stand the battering of being pollinated by a bat, for example. And you discover that these flowers tend to be much heavier and hang down so the bat can get at it, and this sort of thing is not mentioned in the paper. In fact, she doesn't make any discussion of the aspects. What do you do with this?

Jerry: I would point out what she has missed, and the other students would undoubtedly do that, too.

Tom: I was reading some of Jerry's older paper which he had in his files, trying to select papers for you to look at, and these were covered with student comments, and most frequently was "You didn't answer the question, You have been walking all around it, you have a bibliography, but you didn't answer the question."

Participant: How then do you bring back to the student the readers' comments?

Jerry: Get the papers back to them. I record the grade, but I do not record the comments. The student can then keep on file with me either copy, the one I graded or the other one. I do keep one of the copies. I try to get all papers back within a week, hopefully less than that.

Question: Do you keep a record of the students' grades?

Jerry: Yes, I do record that.

Question: Do you use the same questions over again?

Jerry: If I do it is a coincidence, but that is something we have not said anything about. We generate questions and bring them to Tom, and he screens them for whether there are sources in the library so he may eliminate some of our questions, depending on what the hold[illegible] in the library are. Generally he doesn't, but sometimes he does, and sometimes after we get through we wish we had. It's hard to decide whether we have the material or not, without spending a great deal of time.

Tom: We had an excellent example of that this year. The students were asked to discuss sub-speciation in the red tail hawk. The red tail hawk is a species which has a very wide distribution and considerable variation. It sounds like a pretty standard kind of question for an animal ecologist to be discussing. There is a lot of literature on speciation and sub-speciation. Red tailed hawks have been studied extensively and there should be no problem with that question. Unfortunately, I didn't have time to do the detailed kind of search that I would like to have done and we discovered after we had gotten the students into the question that in fact the literature is pretty scanty. It has only been in the last 6 months or so that there has been a good research article on that topic that has been published. In fact that is what stimulated the question. What the faculty member failed to realize is there is no way to get access to that unless you already know which journals to look at on a regular basis. He had picked it up by browsing, which is what I think most of us who have subject expertise do. We browse rather than do a systematic search because we can eliminate a lot of superfluous material and browse in a very limited number of titles. We get some questions every once in awhile that really cause us a lot of difficulty. Unfortunately most of the anguish is on the part of the students because this is all new for them and then to have such a negative feedback from all their work is pretty frustrating.

Question: Where do they go to get materials that aren't in this library?

Tom: For this, they can go to Miami. It is only 40 minutes away, but most of them don't have cars. This assignment is given one week and due the week later, and the idea is not to do a comprehensive, thorough search of the world's literature on a particular topic. They're to use the basic strategy we've given them and hopefully we have selected questions which, most of the time, generate a sizable bibliography from which they can select a reasonable number of sources that we have here in our collection. Sometimes, like the territoriality question, they could have easily picked an organism where we have nothing, and we have to try and counsel the students, "Don't pick a Siberian rat to work on because we don't have the literature." Because we are in regular contact with them we can head off some of those problems. But there are real problems and you have to give attention to them or you develop a lot of frustrated students.

Question: During that week are there other assignments? Do they still come to their classes? Jerry W: There is regular reading in the text every week.

Tom: You might note on the handout sheet that we gave you with the library examination instructions. The copy I've given you is the copy from 1974. We have revised it slightly for this Fall's course. We changed the time allotments at the bottom of that page because of the constant badgering. They say we are being unrealistically conservative about the amount of time that they should expect. We have changed those now. They are now 8, 1, and 3.

Jerry: John just told me he'd spent 15 hours.

Participant: That's 20% of the course.

Jerry: I told him not to do that, but it's too late now.

Tom: The first one is always that way. They spend excessive amounts of time because a lot of it is simply learning to use the library, and they make very little progress on the subject. But by the second one or by the third one, they are just in and out. The research is done very quickly. One of the consistent criticisms of the course is the amount of time required. We raised all of the times except for the organization time.

[Break, then the discussion continued. The tape missed the first comments.]

Question: Wouldn't that be a logical extention of your admonition not to trust secondary sources.

Jerry W: I was trying to come up with something like that. One of the points here is that we want to get out the dependence on us. I don't know very much. The literature knows a tremendous amount. I am going to get out of the way of their learning. After all, in most courses, the teacher sets the upper limits on education. You can't know any more than I do because where are you going to find it out? But there is a lot of stuff in this library that no one person can know.

From the group: That's the advantage of being a librarian. I always say, "Well, let's look for it together."

Jerry W: We're taking that role.

Bob Johnstone(Earlham Political Science Professor, talking about library instruction):

Government documents are an important source for political scientists. But students don't know their usefulness. We are a government depository and reams of materials are sitting up there in the library that might never be used by students who when they do research, go to the card catalog and the standard indexes. What I am trying to do, particularly in American Politics courses, is to get students familiar with the use of government documents so that they won't be turned off by the obscurity of the numbering system and all that. This is useful in two basic ways. First of all, it is useful in gathering additional data. The government is an information generator of enormous dimension. It's an information compiler, in addition to that, and an information promulgator. It's extremely useful particularly for statistical evidence, but not just for statistical evidence. Committee hearings in Congress are of enormous educational value to students of the legislative process. Being able to find them, being able to look them up and dig them out is (extremely) valuable. Not only then, for purposes of gathering hard data, but for purposes of understanding institutional arrangements in the government. Students who are familiar with government documents and can use them easily are made more readily aware of institutional relationships, of the process of government, and also something that is important, to me at least, the stuff of politics. What is going on beneath the organizational flow charts; what is really happening. They find, well, I find, that this is a tremendous way to awaken interest in the government because they find when they do a piece of research on legislative history, that the government is not only some kind of mechanical input-output mechanism, but is in fact human beings who have interests and actions and prejudices. This is particularly true when students are introduced to the legislative documents. Committee hearings, floor debates, and the like are where the heart of government emerges. The purpose of getting them involved with government documents is a) to familiarize them with new sources of data, b) to help them to understand the process of government itself. I don't want to take too much time in laying this out, but let me just give you a couple of examples of what we are working on in the American politics courses.

One of the projects in the introductory American politics course is a kind of legislative history that requires them to produce a term paper at the end which traces the progress of a particular idea or proposal from its first articulation in the government (which more often than not is in the Executive Branch), to its introduction in legislative form and its progress through the Congress, both Houses, and then finally through the adjudication process in the courts. This is an idea which Evan Farber and I are beginning to develop which I haven't done before, following it that far. The way to do this is to pick a piece of legislation that has had all these things happen to it: passed through Congress, has gone up through the courts and had its constitutionality decided. What this project does is require them to a) find executive documents that illustrate the progress of the idea or proposal, b) follow it through the legislative process from its introduction, referral to committee, through committee hearings (We try to find a bill that is controversial, for which there are hearings so that they can see that aspect of it), through the report stage, debate on the floor, the final passage, the President's signing of the bill and then on to the courts where they then get involved with judicial documents. The end product of this is a narrative term paper, which fulfills the expectations of the political science course in understanding the process of government, and secondly, it is a series of library exercises, which introduce them in a fairly comprehensive way, in a way they can't avoid, to the resources of the library.

There are variations on this kind of thing in a course on the U.S. Congress. For example, I had my students do a committee study. They picked a committee of Congress and they examined that committee in action with a variety of types of proposals so that they can see the political realities playing within the confines of that committee, and also understand the relationship of that committee to the parent house. In Constitutional Law courses we have our students do research to update a Constitutional decision made about 10 years ago. They have to try and find out what has happened in that particular area of the law since then, and that gets the students familiar with judicial sources. I think this is extremely important, this library assisted instruction, if you want to call it that, to political science.

I was just talking to a professor from the University of Kentucky today who is here to recruit graduate students to his program in political science. He was saying they were forced at Kentucky to require their students, their first year graduate students, to take a course in how to use the library, because their graduate students were not able to find their way through political science sources. I think, from what I can gather, I've only been here a year or so, students from Earlham at least don't have that problem when they go to graduate school in political science. I'll stop at this point and ask if there are any questions.

Question: Is the instruction in the use of the library provided by the library staff or the political science department.

Ans. It will be provided, and this is something we are developing as we go here, initially by the library staff. They'll come in and give a lecture on each of the stages of this process, the executive documents and how to find them, the legislative and judicial documents, and then the process will be assisted along the way by me and by the library staff in giving assistance here and there.

Evan Farber (Earlham's Head Librarian): Let me interject something here. I found that the most productive way of doing this is if I gave a lecture to Bob's class and Bob is sitting in the class. The interplay between him and me is very important because then he can pull out illustrations which I have no knowledge of and reinforce what I have to say. That is very important.

Bob: Tom and a colleague gave a course last year, for the second time, on government documents. It was 1/2 or 1/3 credit course, and I sat in on that, and I found it enormously helpful to me, but I think it is more useful to the students if they can do it in the context of a class where there is substantive attention rather than going away and not feeling any corresponding reinforcement in the classroom. And that is what we are trying to design into the program; doing something constructive and important in other respects.

Question: Can you mention some of the topics that you have done that went all the way through the executive, legislative and judicial branches.

Ans: Right, we pick a bill that we know in advance has done all this. A good example of that is the Civil Rights Act of 1964, which was a controversial bill, and recent enough that it is a part of comtemporary history. It is a bill that was pieced together through a very complex series of relationships between the Executive Branch and committees of Congress. When it got to Congress there were many attempts to obstruct the legislative process. And then of course, it went on to the Supreme Court and that is a particularly delightful bill because in deciding the constitutionality of that Act, the Supreme Court based it on the Commerce Clause.

Question: How long does it take you to teach this, the government documents?

Bob: The course that was taught was three weeks long and met three days a week for an hour.

Tom: There were a series of exercises to go along with that; they were done between lectures, outside of class. I think it is fair to say that we are incorporating the concepts of that course into the political science curriculum.

Question: How do the students feel about that course?

Bob: This particular course, the one that follows all the way through the judicial process is one that I am going to teach for the first time this Winter term. In the past, I have done this but stopped at the end of the legislative process, and it has been very well received. You can understand why because when you get into those documents, at least when I do (and of course I'm prejudiced) and when I did when I was a student, I found a whole new world opening up for me. I'd forget what I was doing. I'd get immersed in these documents. Some of them are dry as dust, but some of them are very, very interesting. The students find suddenly that a whole new source of information is there for them which they never thought was available. People think that if it is a government document, it is bound to be political in nature, the information is bound to be prejudiced, and therefore, is not worth considering; it is not scholarly. Yet only a tiny part of the iceberg is politically affected. Most of the information that the government collects and publishes is done by scholars.

Question: Do you have an outline for your course yet?

Bob: I have an outline for an earlier course, but I don't have one for this new one drawn up yet.
[The outline for Earlham's separate course on government documents is included.]

Question: In science literature an author cites references which will always appear in articles, that will buttress whatever arguments he made, or to give further evidence. The same sort of thing isn't always available in government documents. How do you approach this sort of problem?

Bob: There are sources that they go to, The Monthly Catalog of Government Publications, which lists things by subject, and it is a pretty exhaustive catalog of what the government has.

Evan: The most important source that they would use now is only about five years old, The Congressional Information Service. It is very thorough.

Question; Do you send them to non-government sources? I'm thinking particularly of things like Congressional Quarterly Weekly.

Bob: Yes, in fact, the Congressional Quarterly Weekly and Almanac are invaluable places to begin. You can get a lot of short cuts; they will refer you directly to committee hearings, and all the other sorts of things that take place.

Question: Do you have American Statistics Index?

Ans: No, we would like to.

Response: Yes, it is expensive.

Question: What do you do for the scholarly literature?

Bob: Well, we direct them to the indexes, Social Sciences Index, and of course Readers' Guide, for general articles. We just started getting the International Political Science Abstracts, which will be a help.

Evan: We have a real advantage using Social Sciences Citation Index because so many kids take the introductory biology course and when they come to the political science courses they are already familiar with the Science Citation Index.

Bob: We get a lot of students who have not had that experience. There is still the "Two Cultures" problem around here, so we have a problem convincing religion and philosophy majors to use the materials, and they are not familiar with these indexes.

Evan: But even the philosophers are picking up Social Science Citation Index. It covers about 15 or 20 philosophical journals.

Participant: What do you use for judicial documents?

Evan: Supreme Courts Reports is the main source, then there are several related tools, the Supreme Court Review, which is an annual collection of articles, that analyze the court's activities of the last year.

Tom: Perhaps we should go on now and hear Evan Farber. He is going to talk about our instruction in psychology, and with special emphasis on the question of how the structure of the literature of psychology affects the instruction that is done.

Evan: This is a bibliography that was prepared for a course called Psychological Process, which is the basic course that all psychology majors take. The thrust of the course is to teach the students methodology in psychology, i.e. experimentation, statistical manipulation. 9.

Part of it is to teach them how to use the literature in psychology. The assignment that we worked out last year, has been developing over a long time. Originally, we used just a typical type of paper, students could choose any topic. The assignment that we worked up last year was that the students would be given a review article, normally a review article that was published 4-5 years ago. The student's job was to take a very specific aspect of that review article and update it. What has been the research so far, how has that particular concept which was analyzed, summarized up to that point. What has happened to that concept since that time? The instruction was given with that in mind. This bibliography (the one being passed out; it is available from the Project Director at 10¢ per page, there are 37 pages) then is for them to keep. We tell them that this bibliography contains all the reference works in psychology and related fields that they are likely to need. In the back of it, beginning on page 27, is the search strategy we tell them to use. (reproduced here). What we talk about first, though, (on page 33, of the bibliography and reproduced here) is a time chart which gives the students some idea of how long it takes an article to get from the research stage into an encyclopedia. The time scale is on the left, and beginning with somebody's research which is published in the form of an article. Eventually it gets into Psychological Abstracts, is reviewed, and finally appears in psychological texts. It gives them some idea of how long it takes these things to happen. They don't have any idea of that, of course. On page 27 is the general idea of a search strategy. I have to tell them how to use this and that it will not apply in all cases. Then we go on to page 28, and I demonstrate a sample search using a particular concept which I chose simply because I was able to talk about it with some knowledge. I used the Pygmalion effect in educational psychology; the effect that students will live up to or down to the teacher's expectations. Starting with some handbook or encyclopedia, you can begin with the Encyclopedia of Human Behavior, looking under "Expectancy effects", going to Rosenthal's article which shows the citation down at the bottom and then looking that up in the card catalog to see if the library has the book. They are shown the use of tracings, so that although they found this book under Rosenthal, one of the subject headings it is under is "Predictions of Scholastic Success", and the idea of showing that, of course, is that tracings are difficult to find, but they can be extremely useful. I never thought about and I'm sure students would never have thought about using "Prediction of scholastic success", as a subject heading. The next stage in the search is use of the Annual Review of Psychology, Psychological Abstracts and the Social Science Citation Index.

Something else I pointed out on page 34, which is kind of an interesting thing but is not related to this particular assignment. What it shows is two catalog cards for what turn out to be the same book. I explain to them how I happened to order one book which I saw the review of in the New Scientist. A British publication which reviewed the British edition. I ordered it because it was by Eysench and then ran across another review of a book by Eysench called, The I.Q. Argument, which I didn't realize at the time was the same book, and I ordered it also. I'd seen a review in perhaps Science. When the book came in, it looked very familiar. I went to check the catalog card and found out that the earlier book we'd gotten was exactly the same book. The only difference being one page of introduction. The text was exactly the same. The point is that the two books are classified differently by the Library of Congress. One in BF and one in LC, and they have different subject headings. One under "Intellectual Level" and the other under "Ethno-psychology", one for education, one for intelligence. The point here (a point we've made again and again) is the inadequacy of the card catalog. You use citations, bibliographies, and abstracting services. The use of the card catalog is very undependable. There are tricks to using it, very helpful things, but it is not very useful because of its inadequacies. The structure of psychological literature is very close to the structure of biological literature. It is very nice that most of the students have taken General Biology, and so they know what I am talking about. That presents a problem because while half of this class were sophomores, the other half were freshmen who had no library instruction at all (many of whom hadn't had General Biology). How do you talk to one group who are fairly sophisticated already? What we had to do in this case (we were talking earlier of overkill as a real danger) was to find out from the instructor who were the freshmen who had not had G.B. and talk to that group first and give them basic instruction to bring them up to the level of the other students, and then I talk about the general resources in psychology. It use to be that we could depend on students proceeding very systematically through a sequence of courses. Now they don't proceed that systematically. We get freshmen taking advanced courses, seniors taking freshmen courses. The problem of overkill, the problem of duplicating effort is a real danger because students say, "Oh, I've heard that lecture before."

Question: Have you tried to develop any assessment tools to use, such as a pre-test which you might administer.

Evan: Actually working with this particular course, Basic Processes, for next term we're working with Dick Johnson on a new assignment. The students are asked to take popular articles from Time or Newsweek on new developments in psychology and then find out what scholarly articles on which that popular article was based. But we will give them this first, before any kind of instruction. Later on in the course, after library instruction, we will give them pretty much the same kind of thing and ask them to follow it through. When they do this, we are going to ask them to log their steps. Actually what we will do is use a tape recorder and ask them what steps they followed, and then compare this with the efficiencies of their first experiences.

Participant: That is a pretty tough problem which you proposed because there are among us (me and my colleagues), people who announce their scientific results in the New York Times and that is the only documentation there is for it. If you gave one of these problems to your students they'd find there was no way it was documented. Even with Time and Newsweek publicity hounds get themselves into those places, and that is the first place it is announced. It isn't announced by sending it to some referred journal.

Evan: That is one of the purposes of the assignment. It is not just a library assignment.

Another participant: Do people do that so they won't be beat out when it is published or what?

First participant: I think that's right. It is frequently a means of establishing priority. You don't see it in people's vitae.

Question: What we run into with psychology is that our library is divided into Sciences and Humanities and psychology is in the humanities except for part of it which is in the sciences. Students go to one place and don't think to go to the other.

Evan: We have the same problem in that physiological psychology is in the Science Library and social psychology and so forth are in the Main Library. Sometimes I just have to come in and talk to the psychology majors and explain why because they are very unhappy about it. If they are using the Main Library everything is in that card catalog. If they are using the Science Library, only the Science Library materials are listed.

Participant: The Science Citation Index and Social Science Citation Index both have some psychology and they don't completely overlap, they underlay. You really have to look and see which journals are there.

Another participant: Is Basic Processes an advanced course?

Evan: No, it's the first required course for psych majors.

Participant: Do you run the same comparable time to the biology course - about 9 hours of library instruction?

Evan: No. Probably my lecture will just be an hour.

Question: Is that because you can build on General Biology? Are you using G.B. as a basic place to begin?

Evan: Yes. The only problem is that you can't depend upon students having had General Biology.

Question: Is there another course that is as basic as General Biology?

Evan: Yes, in the Humanities course which every freshman has to take with very few exceptions. But the library instruction is very general. We are introducing them to very general concepts. I can't say it is basic to everything else because frequently the instruction relates just to the kinds of things they are working on which might be something like George Orwell. That isn't much help in dealing with psychological literature, but again you are dealing with some of the concepts: tracings, use of bibliography, inadequacy of the card catalog, different kinds of indexing and abstracting services. I have to depend on later courses to refer to those materials that are specifically useful for those courses.

Question: Have you worked out the kind of time requirements for this particular assignment?

Evan: Not yet, but we are working on it. We are going to have to put a time limit on the assignment because the complaint we got last time while the students spent only a short time learning how to use the materials, some of them said they spent about 20 hours searching.

Question: You don't have Argonomics Abstracts? That one we found very useful for psychology. It deals in things like space bubbles and the reactions to music being played in the office, and anything to do with biology and psychology combined.

Evan: No. There are lots of abstracting services I'd like to have.

Question: Which ones do you think are most useful for psychology.

Evan: Psychology Abstracts, of course. The Annual Review of Psychology, and now The Social Sciences Index and The Social Science Citation Index.

Question: Do you do anything with Borrows, The Mental Measurements Yearbook?

Evan: We do use it in a course in educational psychology.

Tom: Are there other questions for Evan or Bob?

Question: Is this instruction written into the course description of your courses?

Evan: No, course descriptions are like college catalogs. You can throw in whatever you want to. Course descriptions in the college catalogs have to be written so far ahead that they are written in general terms.

Question: I guess my real question would be: Does it matter who is teaching the course?

Evan: Yes. First of all, some faculty are not receptive to library instruction.

Question: So each semester you negotiate what is going to happen?

Evan: Except when no other person teaches that course.

Bob: In our case, no one else at the college teaches American Politics so we don't have to worry about it, especially with a small staff.

Jerry: That's true all the way across the board. Certainly not in our area. We're not unhappy about that. We see teaching as a form of self-expression. We don't want to push off each other's self-expression on another person. That is not to say that we don't want to argue about the value of a particular method. If the argument doesn't convince, then we say, you do it your way, I'll do it mine because you'll probably do a better job of doing it your way than you would doing it mine.

Evan: It's tempting to make library instruction the end. It isn't. It enhances teaching.

Participant: We are just getting into a more systematic approach to instruction and it really concerns me how we are going to budget our staff time, how are we going to know far enough in advance.

Evan: It is really impossible because sometime the need for library instruction comes up right across the reference desk.

Tom: Jerry and I have been conferring over here in the corner and we wonder how the participants are feeling at this point. Are you so saturated with information and sat in this room long enough that you feel you've got to get out of here. There was one more of these short presentations which I was going to do on chemistry, and Jerry was going to be here to answer questions. We can probably do that at another time, if you feel that you want to get away from here for awhile, or we can go on.

Participant: We sure don't need it, unless you are more perceptive about our condition than we are.

Tom: Jerry's comment was that people seemed to be very excited, have been listening and asking questions, and too much of a good thing might overkill.

Tom: I am going to pass around to you now instructions for an introductory organic chemistry course. What I am giving you are actual copies of the assignments given in two different courses taught by two different people. The first one I am passing around says "Covalent Bond Term Paper" and G. R. Bakker, Spring '75, and that is Gerry Bakker's assignment for the course when he taught it. (Copy included here). Last spring, the course ⑩ was taught by another professor. Because strategically in the curriculum it is the first course we are sure we have all the chem majors and only the chem majors, and bio majors. Chem 11 and 12 which come before Chem 13 have a number of people who are not science majors, and the courses just do not lend themselves particularly to library instruction. Over a period of several years Gerry and I and other people have worked at what kind of library instruction to give; what kind of assignments to give that would be successful in achieving our objectives. The assignment that is written up there is what we used, and from my perspective that assignment has been enormously successful.

Now to do that assignment we had to provide them with certain kinds of instruction. We did not do the kind of thing we did in the Ecological or General Biology. We did not give them an introduction to the chemical literature. We dealt only with the problems of finding information on organic compounds. I am going to pass out to you now for your information the series of exercises that we used. (Copies included here.) I went to the class and talked for about 45-50 minutes dealing with topics like "how organic compounds ⑪ are listed in tables and indexes", problems of inverted and uninverted names," "problems of common and established names", "problems of proprietory names." I talked about formulas and the different systems for formula arrangement that have grown up and are used in the literature. Based on that verbal instruction, we gave them a series of exercises. The first one deals strictly with handbooks. It is a very simple thing dealing with the two or three most important handbooks. The students do these in a week's time and turn in that exercise. The second exercise they get shows how to use the Science Citation Index in searching for chemical synthesis. We try to show them how it can be used to find applications of synthesis procedures. The third exercise (they do these as rapidly as they want but they all ought to be finished in a three week period) covers the use of Chemical Abstracts to find information on an organic compound. I would caution you that we are not trying to be comprehensive so students do not get a thorough introduction to Chemical Abstracts at this point. We are only dealing with access to information on organic compounds and since these are beginning organic chemistry students, their compounds are not complex biologicals or polycyclic compounds. Therefore, we don't go into the depth and detail on how Chemical Abstracts handles these complex compounds. You saw the term paper assignment that we have given. (copy included here) They have to actually work up a synthesis ⑩. and a degradation for a particular compound using that labeled carbon atom as a way of checking the synthesis procedures. It is a nice handle for the faculty member in evaluating the paper.

Last year when a new faculty member taught the course, he was very concerned about the rigor of the course. He felt the course was not adequate to the needs of students going on to graduate school. He was very concerned that there wasn't enough content. We were not able to convince him that he should allow enough time for that kind of assignment because it took a good two weeks at the end of the term to complete. They had no lab assignment for those two weeks while they were doing the paper. The new faculty member did understand a need for some basic instruction, particularly in the use of handbooks and some of the data compilations, and he wanted to get them familiar with some basic tertiary and secondary sources. So he devised an assignment which is on the second assignment sheet you have, "Unknown Chemicals Project, May, 1976". We typed that right off of his handwritten syllabus. (Copy included here.) ⑩. The point of this illustration is simply to show you how different faculty members have approached library instruction and have used it and incorporated it into the course with their own objectives. That's important. The librarians who are present must realize that they aren't setting the objectives for the courses. They are only going to be able to indirectly influence that by working directly with the faculty. This is an illustration of where different objectives on the part of the faculty members result in different kinds of library instruction activities. To prepare the students for this assignment, I gave somewhat the same kind of presentation about names and formulas and how they are arranged. That seemed to be basic. He agreed that that was the basic set of information they needed. Then the students did three exercises. We had them do the handbook exercises we had used previously, but we did not have them do the Science Citation Index or Chemical Abstracts exercises because they were not useful to the assignment. Instead, we had them do a new exercise which is on the use of Huntress and Millikan and the CRC Handbook of Organic Compounds which are two sets of tables which are organized by property and chemical compound class rather than by any alphabetical or formula arrangement. This is a very homely exercise which simply shows them the power of these two particular reference books in finding information about unknowns and how to identify an unknown using the literature. They then took either Huntress and Milligan, or the Handbook and used them for access to the primary journal literature. We just let the student go from those sources to the original journal without the use of indexing tools, abstracts, etc.

Now one of the questions that we are asking and which the professor is asking is what effect this has on the student in Chem 51 which is the upper level organic chemistry course. We are going to ask him at the end of the term to compare his experiences with the students he had last fall, who had had Chem 13 the previous year with Bakker, as opposed to students he had himself this past spring. Are they as good library users this fall as they were last fall?

Participant: What will the library assignment for Chem 51 be?

Tom: Well, they are doing a number of things. They have a number of things they have to find: spectra from the spectra catalogs, and also from the original journals; 2) literature on aromaticity; 3) they have to hunt down literature in relation to their laboratory work. There are no library assignments per se, but there is literature use in conjunction with other assignments. It will be interesting to see how those two groups differ. It will probably determine, as long as we are teaching these courses, the shape of library instruction in Chem 13.

Participant: Do you have the Sadtler spectrum catalogs?

Tom: We have the midget edition which has 5000 spectrum. We do not have the complete (about 30,000) edition. We have several other sources which have more spectrum than that, particularly the new Aldrich catalog. But the spectrum are much smaller, and the quality of the reproductions leaves something to be desired. Aldrich has about 13,000 spectrum in that one catalog. Are there any questions that you want to ask about this documentation. I know it was flying by pretty fast. You are not going to be able to absorb it at this point, but you will at least have it to refer to.

Participant: In addition to this one hour, you have a hands on period in the library?

Tom: The exercises are all hands on. I participate in this the say way I do in the biology guided exercises. We are available. We encourage them to not let frustration get in their way. They should come and ask for help before the frustration level gets high. We think that personal contact is very important any time, even when you have an exercise which is somewhat mechanical and apersonal.

Let me just take a minute now to explain what the strategy is for the rest of the workshop--what the expectations are. First of all, a couple of things that we are going to pass out, without comment, and these are samples of material that come from other institutions. LOEX, I don't know how many of the faculty know of something called LOEX, it is the Library Orientation and Instruction Exchange--a national clearinghouse that collects and disseminates information on bibliographic instruction, in academic libraries.. They have put together a display of the best things that are available around the country in science undergraduate education for library instruction use. The materials are on this table and will be there all day and tomorrow so that you can come in any time during the rest of the day, this evening, and tomorrow. If you see anything you would like to have, we can photocopy it for you or we can write to the original author, which in most cases is a university or an academic library. I also have here, and I will pass this out, a flyer on project LOEX, and a copy of their membership questionnaire. Membership at this point is free, the only obligation is that you fill out the questionnaire form which documents what you are doing at the particular time you fill out the questionnaire. And there is a newsletter they publish and by filling out the questionnaire, you will get on the newsletter mailing. Then I also have two sets of documents, one is from the University of Rhode Island, Food and Nutritional Sciences program, and another is from Cedar Crest College, Allentown, PA. These two institutions were applicants to this workshop, but in my assessment of their application, I felt that they were well beyond the need of the workshop. They already have a good working relationship with the faculty, and an on-going program. (Copies are included here.)

Steve Nelson: Could I put in a plug for the project that Dave Lindwood and I are working on? Our project is funded by the same outfit that is funding this project here, and we are trying to find out what people are doing all over the country as much from the scientist doing the teaching as from the librarians , to try to put the two camps across the country in contact with each other. This is necessarily a snowballing, skimming the waves kind of a thing, but with the view of eventually coming up with a handbook of sources, references, and that sort of thing that will be useful to either group. If you haven't gotten on some of our mailing lists already, we are responsible for deforestation, too, let me pass out a letter that we sent out to some people already and a list of some citations and sources that we are trying to put in people's hands. (Copy included here) Our scope is just a little bit larger than library use. It has to do with the teaching of scientific communication in general. That is why the list of four pages is a little bit broader. It may be old stuff to a lot of you, but it is totally new to a lot of the people to whom we talk. ⑫

Tom Kirk: Let me start this evening by introducing the new face amongst us. Dick Johnson is with us this evening. He is a psychologist by training, was at Earlham, left Earlham and went to the Exxon Foundation as a program director interested in evaluation of educational programs, and returned this Fall to Earlham and is consulting with faculty in the area of instructional development. We at Earlham, particularly those in the library staff, feel extremely grateful to have Dick around because he is sensitive to the kinds of concerns we have about effective library use and at the same time is a very hard-nosed person about good evaluation design. We are looking forward to working with him in a number of projects in the next few years, in terms of evaluation of our program. Tonight's session will be a learning experience for me, as well as perhaps the rest of you. What we are going to do: I'm going to make some brief comments in relation to the documents I passed around, to give you some idea of the kinds of things we tried to do. Then Jerry Woolpy is going to make a few comments about what the Biology Department has done in terms of trying to get a feel for the effectiveness of what we have done. Dick will come in with some general comments as an outsider, perhaps, looking at what we have done and some of the more general problems of evaluation of an educational program and then we are going to open it up for discussion. Quite different from most of today when we were trying to present to you a program with which we are very comfortable. What we present tonight we don't feel as comfortable about. I don't think anybody has an answer to the question of how to evaluate a bibliographic instruction program to the satisfaction of somebody else. Maybe they have satisfied themselves, but they aren't able to convince anybody else that it is an appropriate evaluation.

The materials you have fall into two categories. (1) Some are internal, that is we use them within the course and have not been used to evaluate the program but rather to give feedback to the student: these are the library quiz and the bibliography evaluation. (attached) You also have a copy of the quiz students take after they have completed the guided exercise. Some results of the quiz from the previous academic year are attached to the quiz. (enclosed) The quiz is used internally, and you see some results of one group of students from last year. Almost all quizzes or all kinds of objective ⑬ testing that I have seen in the area of library instruction go to one of the two extremes: i) they are so general in their questioning that any intelligent person can answer them, or ii) they are so specialized that only a librarian can answer them. There seems to be nothing in between that is an accurate measure of a student's capabilities in using the library. Therefore, I have serious questions about the ability of this kind of test to give us any real measure of the effectiveness of student's ability to use the library. I suspect you might ask why we continue to use it. In some sense it is an attempt to coerce the students into taking the exercise a little more seriously than they might otherwise. Secondly, I hope the questions asked emphasize the major points we want them to get out of the exercise. So the serious student who goes back and looks at the answers to the quiz and what they got wrong, will get a reinforcement or check on what the exercise covers. But in terms of whether there is a correlation between the student who does well on the quiz and is a good library user, we haven't really looked at that in any serious way. We hope to be doing more of that in the next few years.

The second form is the Bibliography Evaluation Form, and this is an attempt ⑭ to give the student some feeling for the quality of the bibliography in a very rapid way. The reason it has to be done rapidly is that I have to look at all of them in a large class (273 students), within a two week period. The form must be something that is pretty straight forward and therefore is a very rough approximation of the quality of the bibliography. Of course, there is a lot of room for judgment on the definition of the word appropriateness, so it is open to all kinds of interpretation, and it would be very difficult to compare the results of one group with another, using this criteria. But, again, for internal purposes within the course, it has the effect, I hope, in convincing the student that we take seriously the quality of the bibliography, and they are going to get some fairly personal immediate feedback on how good the bibliography really was. We have a little more data on the results of this particular evaluation over several years. We originally did some experimental work back in 1968 and 1969 using a less refined form of this particular device. There were two experimental groups that we were working with: an experimental group and a control group. Those mean scores are not significantly different (18.6 and 16.3). Those have been tested statistically and they are not significant. The rest of the date for 1973, '74, '75, and '76, has been collected in a less formal way. We have not tested these data statistically, but you get some feeling for the kind of distribution of scores there for last year's class and then you get some mean scores for the previous three years, 1973, '74 and '75. You get some idea of the range of possible scores. Again, this is not an evaluation of the success or failure of the instructional program but as a vehicle for working with the students.

(2) Our first serious attempt which I would try and defend as evaluation is the next item, and that is the Library User Opinion Scale. (see attached) (15.) This scale was developed by a psychologist and librarian here based on some work that was done at the University of Colorado under John Lubans, Educating the Library User, pp. 232-253. R.R. Bouker, New York, 1974. "A" through "E" are each different groups of students and those are interpreted for you on the next page. "A" being the freshman students of last year which is when we first used the opinion scale. I would like you to look particularly at questions two and three. Let's take those. Here we see a pattern with a group of 358 freshmen who strongly agree that the main job of a librarian is to check out books, but we were very heartened to find that groups "B" (freshmen from the general biology course after a term and a half at Earlham) and groups "C" and "D" (samples of seniors) have been able to reverse their opinions of librarians. In question 3, "anything that you can't learn about the use of the library in an hour is probably not worth knowing," freshmen agree or strongly agree with that, and we have been able to turn that around in "B", "C", and "D". We were feeling very good about this evaluation until the results from this year's freshman class came in, and that is the "E" group.

Participant: Now where are you going to go?

Tom Kirk: We started out trying to do an evaluation of changes in student attitudes, and we get this ringer of a new freshman class coming in and they are the same as our upper classmen. What do we do? Is last year's freshman class an aberation? Do we give up our library instruction program because all of our new students coming in already have appropriate attitudes? Well, obviously, it needs some more study. Dick has suggested that some of the questions might be a little too transparent, and that we need to think of other ways of getting at the same information. This is perhaps the one thing that I would leave with all of you, and the thing I am most convinced about is that librarians should not try to do too much in the way of evaluation and test construction without the help of some professionals.

Now, the rest of the data (see attached) might be of more interest to librarians than it might be to faculty members because these are the kinds of statistics ⑯ that are kicked around in the library profession. They are visible indications of use of the library which might indicate the success or failure of an instruction program. Whether or not the instruction program causes the use is not proven. There has not been much in the way of serious use data for academic libraries since about the early '50's and we need to have more comparative data from other institutions, and I would like to see other institutions collecting this kind of data, so that we can get it into the literature for comparative purposes. I for one would like to know whether the patterns of usage that were described in the '50's are still holding or whether they have changed.

Participant: How can you tell the use of periodicals that don't circulate from the library?

Tom Kirk: Yes, we have counted everything in-house. There are ways of doing it. We have taken the standard methods that are used in the literature in other studies of this kind. It is simply asking the patrons to not reshelf, and the library staff reshelves. In this way we get a sampling which is a portion of the total use; it is not a record of total use. We have been using these figures, particularly the use of the bound periodicals, for administrative purposes; decisions about budgets when budget cuts come along.

Participant: How does that work? What does the portion of use mean?

Tom Kirk: Other studies have shown that the method we use is a sampling technique which accurately represents a portion of total use. But we don't know what the proportion is in our situation. We only know from the other studies that the proportion is anywhere from a third to a fourth of the total use.

Dick Johnson: That kind of thing might not work between institutions. But your assumption here is that within an institution the rate at which somebody reshelves might be the same regardless of periodical title.

Tom Kirk: This is a two year study; the third year has just been completed, and the data is being typed up now. The bound periodical use data confirms Bradford's law of scattering to a "T" so anybody who tries to use this kind of data to defend library instruction is in a little bit of trouble because it appears that the Bradford law applies whether you have intelligent users or not. I don't know how much close scrutiny of these results you want to put in right now. I think perhaps some of the more general issues about evaluation might be a more fruitful use of our time this evening. We can come back to this if you have questions about particular pieces of information, and we can talk individually if you have questions about it.

Jerry Woolpy: I want to start where you left off with the attitude survey. That second item that was so troublesome to us - this year's freshmen don't conform to the model, causes us to reject the device. My impression is that

that is what we do when we do evaluation in general. If it confirms our previous positions of what is going on, we think that it is effective evaluation, and if it doesn't we decide we need a new measurement! I don't know whether that is fair, but it is in fact true.

I would like us to make a distinction between evaluation and student feedback. That is, true evaluation in the sense of control groups and effective before-after measures probably can't be done by the instructor, or are not likely to be done by the instructor in the usual line of duty of teaching his course, I suspect that that requires a kind of expertise that most teachers or librarians don't have: this is an expertise in testing. Even if they do, it takes so much time and effort that they probably won't invest it. In general, good evaluation, if it is done at all, is probably done by outsiders, at least by somebody not directly involved. I think that it is probably appropriate. It is like the separation between auditor and bookkeeper. You don't use the same person to audit your books as to record the figures on a day to day basis. So what I have done here, I don't want to confuse with evaluation. I have gotten feedback from people who have taken the course and tried to count and measure what they say about it. I don't think it bears much relationship to their actual behavior but some probably. What that relationship is, it would be very hard to estimate. What it does show is something of what their attitudes are. At the end of each term that we teach this course, we have given a battery of multiple choice type questions which include some items which I have duplicated for you here. We usually ask them about 30 or 40 questions which include every aspect of the course we can think of. Did you like the text? Did you think we used the text appropriately? Did you enjoy versus did you learn a lot from it? Which were your favorite lectures? Which were your least favorite? Which were the most enjoyable versus which were the most educational? We get all kinds of attitude surveys like that and tried to follow-up on them by changing the course the following year. I've pulled some questions that pertain directly to the library assignments in the hopes that they might show something about the attitudes. (see attached) "Was the library over emphasized?" Thirty per cent ⑰ agreed that it was over emphasized, but 69% thought it was appropriately emphasized. You heard this morning that a lot of people spend a lot of time on these assignments, so that is what they mean by emphasis. "Comment briefly on library examinations as an educational device" - 92% say it is valuable as opposed to not valuable. That is the kind of thing we like to hear so it must be a good device! Of course they know that when they fill it out; this is anonymous. They do know what we want to hear, and we have been telling them what we want to hear all year. We keep telling them that this is an important experience. Remember I told you that this morning. I was just playing it straight. I tell them all the time that this is a good experience. Examinations: there is an hour exam as opposed to what I call library exams which are alternated in different sections in different phases of the course, one substituted for the other. You see 48% learned less from them than the library exam; in other words they thought the library exams were better learning situations. How about worked hard: well, they always worked harder for the library exam, if that is important. Then I will give you an over all statement. The best course I ever took: 28%; that's really not very good, I suspect, relatively speaking in the college, although I'm not sure. If you were to add up every student that thought every course was the best, you would find out that there were considerably more than 100%. At least that has been my experience with evaluation. "I worked harder in this course than others?" Clearly they did - 85% agreed. Average number of hours per week. In spite of the fact that we've heard some woeful tales today about how many hours individual students have spent, it averages out to about fifteen hours which is what the college standards are. It looks like three-quarters of the class is in that range. And some of them, a substantial portion, are under 10. The ones that are over twenty really complain alot.

Jerry Bakker: The intriguing thing there though is that this is considerably less than the college expectation is, and yet 85% say they've worked harder on this course than on others.

Jerry Woolpy: Right, so in fact what Jerry is suggesting and might be concluded from this, or at least guessed at is that they don't work 15 hours in each course. And I'm sure that's true. Now the numbers are too small to make any sense out of II, but I give them to you anyway because I wanted to show you that we were at least trying to look at some of the possible correlations. Nine students who said that they expected to get an A in the course claimed they learned more from the library exam, and then compare that to the C students, 50%. Which makes it look like the C students are getting more out of the library than the A students. So I don't know, like I said before, the numbers are so small that you wouldn't want to place any stock in that. And the fact that the B student doesn't follow the trend, and be between the A and the C, is troublesome with that interpretation. But maybe there's things there that are linearly related. In any case, we're looking for those kinds of trends and we haven't found any clear indication that the students that are doing different levels of work are responding to this differently.

Jerry Bakker: Yes, but the difference between the A and the C could be just as easily explained by saying the dumb students like libraries and dislike hour exams.

Jerry Woolpy: III is a general question which we have asked for nine years with no substantial difference. The library is always thought to be more difficult and time consumming, but appreciated more. Some graduating seniors, who were polled last year about what they thought of their general education courses, cited the General Biology library experience as being one of the most important things about their general education. We've gotten several antidotal accounts from biology graduates in graduate school who report, as I told you last night, that they're more capable in research, and particularly in initiating research, independent studies, and term papers, than their fellow students. It has been consistently reported, that their fellow graduate students, don't know how to use the library and by that they mean they don't know the first thing about what information tools there are. They have heard about Bio Abstracts for sure. They probably have some idea how to use them. But they haven't heard of Science Citation Index and they wouldn't know how to really search a topic in the way that you have already done today. Now, as I said in the beginning, this is not what I would consider evaluation. This is an attitude survey that's pleasing to the people that do the course, and it helps them to some extent to modify a course in the direction of student opinion. Or not in the direction, at least to find out how we're getting across. I use to think this was evaluation but I'm sure it isn't now. I use to think it because I put a lot of time into writing those questions and so forth and I just got carried away with it. But now that I've been thinking about evaluation, I recognize that I'm never going to be able to do it with my own courses.

Question: Have you ever tried to relate results to class standing?

Jerry Woolpy: Yes, I've done that and the seniors are less patient, more exasperated, and the freshmen are more easily enthusiastic. There is not much other difference. But we never have enough numbers from the upper classmen to be able to do much with them. I recommend doing these kinds of things, incidentially, but not making claims about this as formal evaluation. I think it's helpful to do this kind of thing and then change a course in the direction that students seem to be indicating. But one thing you can find out from this is working people too hard, or what they claim to be too hard, is not something that will get a course a bad rating. That is, we consistently got told we were working them too hard, but we also got consistently told positive things about the course. We also found that when an assignment was enjoyable there was also claims that they learned alot. On very few questions did they separate out appreciation/enjoyment from learning. Now I don't know whether that's real or not. But that's the kind of results that we get.

Question: Do the students have some sort of a survey for every course that they take?

Jerry Woolpy: No. The College places more emphasis on teacher evaluation than course evaluation here. At least intil recently but I think we're moving away from that. We have gotten very nervous about promotion and that sort of thing, and we require our faculty to do student evaluations of teachers at the end of each course. As a result of this, there's a great deal of nervousness. We are moving away from that a little bit now, or at least we make the questions more general and encourage people to do course evaluation in addition to teacher evaluation. That is to ask questions about the materials of the course and also to ask questions in the middle of the term instead of at the end, or both.

Question: You said that it was a mistake for the instructor to evaluate his own course.

Jerry Woolpy: In the sense that objectivity is very difficult.

Question: Then wouldn't it be a mistake then for these students who are taking the course to evaluate the instructor?

Jerry Woolpy: Yeah, I follow your line of reasoning and I think that in many cases it's not an effective way of evaluating. But I don't think we can ignore that information either. That is, I think that student response to a teacher makes some difference.

Participant: There is so much temptation to evaluate the teacher as a good guy or a bad guy, and not for intellectual content of what got exchanged. It takes a lot of time before you can do that. Come back five years later and tell me what you think of that course.

Jerry Woolpy: We'd also like to find out five years later whether they do more work in the library than the control group. Whether we made any impression on them that way. We don't have this information. We talked about applying for a grant to go chase after our people and examine them about the impression that various courses have left on them. But we've never done it.

Dick Johnson: And now I'm suppose to come up with the pet solution that for all of you would be a nice neat formula! What I thought probably I could do most usefully is to go back and forth on specific issues that you may have, talking perhaps about some of these things as horrible examples. One thing if you start talking about evaluation, library evaluation, it looks like it's a subset of educational instruction evaluation in general, and that looks like it's a subset of research in general, so everybody knows how you go about doing it. There's a basic logic to scientific method and you apply it to this subset of an area and it looks like it's a little more applied rather than basic. It's a little trickier because there are a lot more variables, you don't have it in a laboratory to control it, otherwise it's basically that kind of a problem, it's a problem in experimental design. And that has been the dominant theme in thinking I think for twenty years or more anyway. I would label that the logic of the evaluation. That is, one can talk about the ways in which we think about the things that go into a design in terms of the logic of how they interact. Part of what I want to talk to you about is that, the logic of evaluation. One of the problems with this is that more recently there has been more and more concern about whether or not the basic paradigm of research really does fit instructional program evaluation. There has been a lot of discussion, for example, in the middle 60's where Campbell and Stanley go off into talking about quasi-experimental design. (Campbell, Donald T. and Julian C. Stanley. 1966. *Experimental and Quasi-Experimental Designs for Research*. New York: Rand-McNalley 84 pp.) You can't quite do experimental designs in this area, but there are some that look like experimental designs but they got some problems in them. More recently there have been other discussions which are really raising, I would say, very different models of what the logic is for designing an evaluation. Michael Scriven, for example, recently has talked about a *modus operandi* approach to evaluation. (Scriven, Michael. 1976. Maximizing the Power of Causal Investigations: The Modus Operandi Method. Pp. 101-118 IN Glass, Gene V., ed., *Evaluation Studies Review Annual* vol. 1. Beverly Hills: Sage Publications) People like Malcolm Parlett are talking about illuminative evaluation. (Parlett, Malcolm. 1976. Evaluation as Illumination: A New Approach to the Study of Innovatory Programs Pp. 140-157 IN Glass, Gene V., ed., *Evaluation Studies Review Annual*, vol 1. Beverly Hills: Sage Publications.) They are more anthropological models of evaluation. The arguments here are going something like this: in a normal piece of basic research the design of the research is related to the questions you're asking, and the research is designed for those ends. In a typical evaluation, the design of evaluation comes after the fact. Here's a system under operation, here's an innovation, here's a new course, and now let's design the evaluation around it so the evaluation must necessarily be secondary. You've got a problem to begin with; the design of the inquiry is dependent on the design of the program. Now this is to some extent the same kind of problem that one might have in applied areas like engineering or something like that. But not quite. You get into some messy problems in human engineering, I guess you could say in education and libraries. Another problem is that these are tremendously complicated systems. People talk about multi-determination of things. For example, you get some lovely statistics on library circulation. What is it that leads people to take out or not take out books. Just imagine the factors involved in that. Besides, for example, instruction in library techniques. I can remember a friend of mine in graduate school, we could talk about another thing one could evaluate libraries for. People going to libraries sitting in them, there have been counts on that undoubtedly. And this guy varied his sitting and working in the library and it had to do with the fact that his apartment was unheated. So one could see him in the library more often at certain times than at other times because he studied there much more comfortably. The point of all this is when you get into human systems the kinds of outcomes that you look at are determined by a lot of factors, and when you try to sort out one factor and try to find out what it is, it's very difficult. On a complicated system one can do several things. One can try to simplify it, and this is the general laboratory approach, let's get rid of all those other factors. And then you get a very strange kind of library instruction where you're not going to let the kids in the library except during, you know, you get very funny kinds of situations. Or else you get into enormous masses of data where you're trying to factor out those things by looking at different systems that operate in different ways. People have pointed out that this may be a basic problem in evaluation research. These are, in a sense, insoluable issues and put this type of evaluation in a different domain than basic research because you don't have control over those kinds of things and you may need a different kind of thing.

Participant: The library in Madrid, Spain has a bar attached.

Dick Johnson: Get good use around certain hours does it? Just don't give them the exam right after... The point of all this is that part of what I want to start out saying to you is to contradict my colleagues here. When you start talking about evaluation research, I think there are a lot of different kinds of evaluation. I see what Jerry did; I would label it evaluation. There have been some very interesting differences pointing to formal versus informal evaluation. While I understand what they mean, that isn't a very critical dimension to me. I start immediately by wanting to jump at some other issues that come up around evaluation that I think are very critical issues and I would like to point to them and then go on. I think that there probably needs to be a real look at the politics of evaluation. Evaluation is done for something. One evaluates a particular library program for one's own use; or perhaps one evaluates it to prove to the Dean that this money is well spent; or to one's colleagues that the library instruction is worthwhile thing. So one of the points I would want to make here is that in basic research, I'm not arguing that basic research has no goal to it, but there's an extrinsic foreness in evaluation research that I think we ought not to ignore, but I think we ought to point to and look at. [Break in tape.] And you see probably that's going to come at least in part from the psychologists, because it's treated as a class project which is related to the student learning about data in the literature of psychology. One of the things that's going to happen is the design now, we're not through with it yet. This doesn't happen till January, so it must change ten times at least in the next two months. The idea is that early in the course, two or three days after the student arrives, they're given a problem that they're going to have to research in the library, and to insure that not too much student time is spent on it, they will be timed. They've got a period of time in which they're suppose to handle this problem by searching for those sources. Then later on comes the library instruction and it's going to come in a different context because we get them working on specific exercises where they're going after material. So it won't necessarily be related to that, and then further on there's going to be this kind of exercise repeated with a different assignment, and again the time arrangement. One of the problems sometimes is that you choose a measuring device that isn't particularly sensitive to differences. You have to think about the differentiation you're wanting to make. If you've got an experimental group and you've got a control group, and you measure with a task that nobody can do, they look the same. Or if you measure with a task that everybody can do they look the same. So you've got to pick a task of the right difficulty so they fall into two groups. And when you're looking at individual students, when you're trying to see differences among them, you gotta pick tasks of the right kind of difficulty. And part of what we're hoping to do in timing this is prevent students from covering up their sloppiness by spending more time. We're hoping to be able to differentiate the effects of library instruction that way. But it will be a straight pre-post experiment at this particular stage, at least that's what it looks like now.

Participant: The timing thing assumes that they all meet a minimum performance criteria.

Dick Johnson: They'll be given say two hours in which to deal with this problem. We're talking now about the fact that they're going to take a taperecorder with them. They're given a problem and they're going to talk into the tape recorder reporting on what they're doing. So the tape recorder is their timing device and it also gives us a stream, in effect a cheap journal, of exactly what's going on and how long it took them to do things and their comments. Part of what we're getting them to do this for is they're going to use them in a data reduction exercise and start talking about the data of how humans process information. So it works nicely in psychology too. And we can then talk about translating this taped data from the whole class into a matrix of data to look at human information processing. So, we'll get some journal type data on their going through the exercise, we'll see what they're able to achieve at the end of the fixed period of time, and we've got some de-bugging to figure out what the time should be. We said no more than two hours, maybe it will be less, maybe we'll have to go more. But what you need to do on these kinds of things is you need to really run a few students through it to make sure it doesn't fall flat on its face.

I can talk more specifically on the logic of evaluation, but there are a lot of good text books in the area that you can look at and it's better information communication then my sitting here and talking to you about it. We can talk about control groups, and we can talk about all these kinds of things if you want to. I think it might be more useful to talk about purposes and what it is you want to measure.

Participant: You talked about using the evaluation to gauge the progress of whatever task you're doing. Could this simply be a very perceptive instructor, who is aware of these things and simply by thinking about what is happening, this won't be a formal evaluation, of course, will be able to alter or continue the course?

Dick: I think all of us in the widest sense of the term are evaluating. I think the problem, and here's where I come down hard and maybe I'm going in your direction, Jerry, when you talk about formal. The problem with informal evaluation is that some of the errors that creep into all evaluation are very likely there. For example, sampling error. Now if you get into any formal evaluation they start worrying right away about sampling error. The worst kind of sampling error is the guy who after his lecture rates that lecture on the basis of the three students who came up and talked to him and patted him on the back and said great when there were 80 in the class. That is a sampling error, and it's an awful sampling error, and unless that professor is purposely trying to get outside of that kind of sample you've got problems. The other problem is that we're not good information processers unless we train ourselves to do that. I remember one of the first classes that I ever taped was of me leading a discussion. I was confident I'd led a good discussion, with a lively discussion, and good class participation. But what I did as I went back over that tape I counted the people that responded, and I checked the time that they spent talking as opposed to what I spent talking. It was a very humbling experience to discover that there weren't quite as many people talking as I had thought there was, and some of those brilliant comments that had been made had been made by me and not by students out there. So, some of this getting outside of the informal system and pushing yourself to test against things that are a little more objective I think is a good idea. So, I'd like to see us be perceptive, and I think a lot of things that go on as we adjust courses come to us informally this way. And I'm certainly not saying don't listen to them, you know, you get a graduate student coming up to you and saying, "Wow I'm way ahead of everybody else." You don't tell him don't tell me that, write it down on your answer to this question here. Balony, that is ridiculous! But on the other hand, whenever you're gathering data related to an evaluation you ought to be aware of the bias' of the data. There is no scientific instrument that I know of in any field that measures without error. But the important thing is, being able to estimate that error to know how big it is, to get an idea whether or not it's a constant error in one direction. And these are the ways that we've got to tune ourselves as well when we're doing evaluation on this kind of instruction. One of the kicks I'd have with you here (referring to the Bibliography Evaluation Form) is that I think you could tune your error finer and you might see something there. That some of the differences you're getting are really interesting differences, and if you get that reliability up you've got a chance that this kind of thing could be a very very interesting piece of data.

Participant: What would you recommend for it?

Dick: Well, they're easy solutions like extending the length of it. One of the ways you get higher reliability is to extend the length of the instrument. But, of course, we're running right smack into economics. Another thing that would have been interesting would be try to do some work getting some other raters in there and looking at your scales to see if you could build some better scales where you get some very nice tuning. Partly I'd love to go over your data and look at the raw data to see what that scatter looks like. That's a very small scale, and to get a difference of 16 to 18 is a fairly large difference. You must have been getting a lot of scatter in the data, and it would be interesting to look at that scatter to see what it looks like.

Participant: What are you talking about?

Dick: I was talking about the Bibliography Evaluation, I find this extremely intriguing. The two samples you've got look like neat clear-cut and even I can notice the difference between the two, and I probably would rate them the same direction you do. Now, as soon as I went through this and tried to score it, I didn't come out with the score you have. And if it's the case that your scatter in scoring has got an error in it, you're fluctuating up and down, then the bigger that error is when you try to compare two groups with each other you're going to get a lot of overlap in those groups because of that random error. And if you can cut that down, you can see small differences. You can do it other ways: you can expand the size of the groups, you can expand the size of the instrument to get a bigger scale to measure on. But those kinds of things also run you into more money, and there may be some cheaper ways of working with the instrument itself to make it more reliable.

Participant: And how would you do that?

Dick: I would get some other raters in. I'd do some pilot studies on the scale itself to see if you could get that scaling so that people can really agree. See, part of what I'm telling you is that I think that he probably is a poor rater, as we all are. What you need to do is you need to build scales where you can do a very reliable job.

Participant: When you say scaling what do you mean?

Dick: Let's imagine that you're looking at students who are doing a search in the library, you're following them around unknown to them and you're rating them as to how efficient they are in finding the right sources, and you just rated this one 3 and that one 4 and so on. Now what I'm saying is, these are judgemental scales. That's true in any kind of measuring we're doing. But sometimes the judgement can be made really pretty nicely and reliably. If you and I are reading a guage there we can do pretty well if we know how to read guages. But when we're starting to read students and let's read that criteria set down so that we're coming out very close on those numbers, I get very worried about this guage that we're reading because it may be a different guage or it may not be worth reading at all if our numbers are random scatters. So what you've got to worry about in any measuring device is how reliable is it. Let's imagine this. You've been following the student around rating him or her, and I've been taping the whole thing on video tape, and a month later I come back and say "o.k. I bet you've forgotten this, you watch the tape now and rate again and we'll see if your numbers are the same." Now if you've got perfect reliability you ought to come up with the same numbers again. To the extent that your numbers are not the same the second time around, we're talking about error in your rating scale. But I'm saying the problem here is I'll bet you if I got him to rate these papers over again using his very scale, he won't come up with the same numbers.

Participant: I can't understand how your rating makes any difference because as you said you don't know anything about it, and so you're just picking numbers.

Dick: I was kidding in that. If I'm going to be a rater, I better know these books. The point I was making here is that you want to look at reliability because if you've got an instrument that's waivering all over the place and you're looking at these two groups how are you going to find any different between those groups unless the difference is enormous. So part of what you've got to do when you're measuring is try to look at the reliability of the data and push it as far as you can in getting good reliability.

Tom Kirk: Just to verify what Dick said, I tried in the last few days to re-evaluate those bibliographies using the same criteria, and I couldn't come up with the same scores either. I couldn't justify the scores they came up with. Those were done several years ago. My expectations have changed.

Dick: O.K. Now that's different though. That's not reliability. What you're saying is your measuring instrument has changed. Once you have a measuring instrument it may drift over time, and I'm getting more and more demanding in my expectations of students.

Participant: Are people going to have a chance to get some reactions later on after they've thought further about what sort of evaluation they are going to do on their own projects later on this year?

Participant: I've been sitting here wondering if evaluation is necessary. And the reason I say this is because Lucy Geckler and I are going to go home, you'll hear about what we plan to do tomorrow, we're going to put something in a vacuum and I don't need to evaluate it. I know that anything you put in that vacuum will be better than what's there now.

Participant 2: Will you be allowed to do it year after year if you don't?

Participant 3: If it doesn't take any more time and money, yes.

Participant 1: I would take the position that I've listened to the students as they complained year after year. I try to be intelligent, I'm kind and so forth in improving the system, but I'm there to teach physiology not teach library science. I want them to know about library science so they can use the library to help themselves learn physiology. Beyond that I don't care.

Dick: I bet you care about the efficiency of it though.

Participant 1: The efficiency is going to be 4000% greater than what it is already.

Dick: My first reaction would be to say hallelujah if you question whether you need to do evaluations because that's an important first step.

Participant: Well maybe ten years from now somebody will scratch his gray beard and say maybe we ought to evaluate this thing and see if we can't improve it.

Jerry Woolpy: You might have some political things that will require you...

Participant: Like what?

Jerry Woolpy: Like, for example, your college telling you that people taking your course are really cutting in on doing homework in their course.

Participant: I'd say that you have to teach a more attractive course.

Jerry Woolpy: The kind of information you get when you don't evaluate is; a student says, "My friend spent 48 hours this week on that library exam." Am I to go around thinking all my students are spending 48 hours a week on their library work. I must be way off on the timing of this assignment!

Particpant: Well I will counter by saying that you've been in this for ten or more years, we're just starting. We would like to know what you find out when you do your evaluations.

Participant II: If you were starting off, what kind of things would you try to measure? Is the measurement of time that students spend on a course, or at least of their attitude toward it, appropriate?

Dick: Don't get caught though on their measurements. What you've got to ask is what is your program for, why are you thinking of putting evaluation in and what difference would it make to you if you did evaluate. If you can't answer that, it's going to make any difference, you shouldn't spend the money or time on evaluation. But if there's something that could guide your program in its development later on then there may be a reason for going ahead and doing some evaluation.

Participant II: Well then let me turn it around here and say what are the kinds of things that would be most helpful in this.

Dick: This is going the wrong way around. We can count the bricks in the building, there are all sorts of things we can do.

Participant II: Then what do you do?

Dick: There are lots of things that one can go around counting. What you've got to do is you've got to think about why are we starting this program.

Participant: I gave you my answer.

Dick: O.K.

Participant: I want to make it easier for the kids to use the library. I'm not trying to seduce them into using it more often. I just want to make it easier when they do use it to get to the information they need with more efficiency.